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THE PLANT LICE OR APHIDIDAE
OF GREAT BRITAIN

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OF
GREAT BRITAIN

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BY

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PREFACE.

THIS volume completes the description of the British Aphides as far as at present known.

There are numbers of species described from Europe, some of which on further search will probably be found to occur in these Islands and new species undoubtedly remain to be discovered.

Some of the identifications will no doubt be criticised. This especially applies to those insects which live in the soil. Their exact generic position and identification is in many cases difficult to fix as the alate females and especially the sexuales are at present unknown. Little is known of the life-history of many of these subterranean insects.

Recently Dr. Mordwilko, of Leningrad, has added much of interest concerning them, having traced the aerial forms of several common subterranean species, species previously mainly known from ants' nests. The aerial forms he has shown to be the gall makers on species of *Pistacia*, plants which do not occur in this country, but which once existed in the Tertiary Period. The ground forms having continued to breed here for countless years since their primary host plants died out.

A good many of Walker's species have now been traced, the types being in the British Museum of Natural History, the Hope Museum at Oxford and in the Dublin Museum. Many of his specimens do not seem to exist and Walker's descriptions were mostly far too short to enable a definite identification to be made without an examination of the types.

My thanks are due to the Ministry of Agriculture and Fisheries for obtaining for me a grant from the Development Commissioners so as to enable this last volume to be printed.

I must also again thank Mr. F. Laing, of the British Museum, for giving me so much unstinted help and for adding much additional matter and reading and correcting the proofs of this and the two preceding volumes ; without his help they could never have been completed.

It is hoped this work will be useful for a few years and will stimulate many to study this family which is not only full of interest but of considerable economic importance in connection with Agriculture, Horticulture and Forestry.

FRED V. THEOBALD.

Wye Court,
Near Ashford, Kent.

December, 1928.

Sub-tribe CHAITOPHORINA.

This sub-tribe has ocular tubercles; the antennæ with prominent hairs; cornicles short, truncate, enlarged at the base. Body also hairy as in the *Pterocommina*, but the cornicles at once separate them from that sub-tribe. Cauda usually distinctly knobbed. Some are colonial, others live isolated. The antennal segments may be five (*Sipha*), or six (*Chaitophorus*). The genus *Atheroides* Haliday is placed here by Baker.* It certainly has close affinities to *Sipha*, but on the other hand, as pointed out by Laing† it closely approaches the *Lachnina*. In both *Sipha* and *Atheroides* the antennæ are of five segments and both have the rostrum of three segments and the first abdominal segment distinct. In *Sipha* the cornicles are well marked, but in *Atheroides* they are merely pores and the anal plate is rounded and the cauda is *apparently* absent as in the *Lachnina*. The absence of cornicles however, should preclude it from that tribe. At present I leave this genus in this position.

The genus *Periphyllus*, the species of which have usually been placed in Koch's genus *Chaitophorus* with *aceris* as type, is quite distinct, the cauda being rounded and not knobbed as in the *Aphis populi* of Linnæus, which Gerstæcker set as the type of Koch's *Chaitophorus* in 1856.

Five genera occur in Great Britain in this sub-tribe and tabulate as follows:

- | | |
|---|-----------------------|
| 1. Cauda distinctly knobbed; anal plate entire. | 2. |
| Cauda not knobbed but rounded. | 3. |
| 2. Antennæ of 5 segments. | <i>Sipha</i> . |
| Antennæ of 6 segments. | <i>Chaitophorus</i> . |
| 3. Antennæ of 5 segments. | <i>Atheroides</i> . |
| Antennæ of 6 segments. | <i>Periphyllus</i> . |
| Cauda truncate. | <i>Laingia</i> . |

*Bull. 826, U.S. Dep. Agri. 33, 1920.

†Ent. Mo. Mag. LVI., 3rd Se. VI. 38, 1920.

Other genera placed by Baker in this sub-tribe not yet noticed in this country are *Patchia* and *Neothomasia* with six segments to the antennæ, the former having the anal plate divided into two quite separate parts, the latter with it entire or slightly indented.

Genus SIPHA Passerini.

Passerini, Gli Afidi, 28 (1860); Aphid. Ital., 63 (1863); Ferrari, Aphid. Liguriæ, 78 (1872); Del Guercio, Rel. d. R. Staz. Ent. Agri. Firenze, II., 116, No. 4 (1902); Redia II., fas 2, 127-151 (1905); Wilson, Canad. Ent., XLII., 386 (1910); Van der Goot, Beit. z. Kennt. Holland. Blattläuse, 379 (1915); Baker, Bull. 826, U.S. Dep. Agri., 33 (1920).

Antennæ short to moderately long, of 5 segments, iii. longest; flagellum of v. not long. Cornicles small, tubercular. Cauda small, knob-shaped or conical, or *apparently* absent. Males, small, apterous. Venation of viviparous female normal. Oviparous female apterous, moderately large. Type of genus *glyceriæ* Kaltenbach. The members of this genus mainly live on grasses (*Gramineæ*) where they lay their eggs. Several species have been described in Europe, two by Kaltenbach (*S. glyceriæ* and *S. graminis*); one by Macchiati (*S. bignoniæ*); one by Passerini (*S. maydis*); four by Del Guercio (*S. berlesei*, *S. italica*, *S. elegans*, *S. schoutedeni*); Walker's *Aphis littoralis* also comes here.

Del Guercio tabulates these (exclusive of *S. graminis* and *littoralis*) as follows:—

1. Apterous viviparous ♀ uniformly spinose, yellow.

schoutedeni.

Apterous viviparous ♀ non-spinose.

2.

2. Rostrum styliform; segment iii. much longer than preceding; body yellowish green.

berlesei.

Rostrum non-styliform, segments more or less equal.

3.

3. Apterous viviparous ♀ with antennal segment iii. equal to iv. + v. Body oval, yellowish-green, with some black spots and lines.

bignoniæ.

Antennal segment iii. longer than iv. + v.

4.

4. Apterous viviparous ♀ elongated oval.

5.

Apterous viviparous ♀ more oval.

6.

5. Antennal segment iv. a little longer than v.

6.

Antennal segment iv. a little shorter than v.*

7.

* This appears to apply to the basal part of v.

6. Body opaque-green, with median pale dorsal line. *glyceriæ*.
 Body uniformly green, without the median pale dorsal line. *italica*.*
7. Body yellow, lined with black, with 4 orbicular spots of same colour, placed in a trapeze on pronotum. *elegans*.
8. Body shiny black, uniform on dorsum of alate ♀. *maydis*.
 Abdomen of alate ♀ yellow, lined on dorsum with transverse bars and large black spots. *maydis*. v. *avenæ*.

BRITISH SPECIES OF *Sipha*.

Sipha schoutedeni Del Guercio.

Sipha littoralis Walker.

FOOD PLANTS OF *Sipha*.

<i>Aira</i> sp.	<i>S. schoutedeni</i> Del Guer.
<i>Glyceria fluitans</i>	<i>S. schoutedeni</i> Del Guer.
<i>Juncus lampocarpus</i>	<i>S. schoutedeni</i> Del Guer.
<i>Phalaris arundinacea</i>	<i>S. schoutedeni</i> Del Guer.
<i>Poa annua</i>	<i>S. schoutedeni</i> Del Guer.
<i>Gramineæ</i> (general)	<i>S. schoutedeni</i> Del Guer.
<i>Gramineæ</i>	<i>S. littoralis</i> Walker.
<i>Lotus corniculatus</i>	<i>S. schoutedeni</i> Del Guer.
<i>Trifolium repens</i>	<i>S. schoutedeni</i> Del Guer.

SIPHA SCHOUTEDENI Del Guercio.

Aphis glyceriæ Walker, etc. (non Kalt.).

Walker, Ann. Mag. Nat. Hist., II., Se. 2, 43 (1848); Zool. XXVIII., 2000 (1870); Del Guercio, Ann. Soc. Ent. Belg., XLIV., 134 (1900); Del Guercio, Redia II., 132, Tav. XIII., figs. 1-6 (1905); Laing, Ent. Mo. Mag., LVII. (Se. 3, VII.), 119 (1921).

Apterous viviparous female. Various shades of green to greenish or reddish-ochreous; in the later broods a few almost red. Legs paler than body. Skin markedly spinose. Body with long spine-like hairs all over dorsal surface. Head broad, with several long hairs as figured; 2 marked ones in front, 4 more or less in a line on vertex, and 2 smaller ones between. Eyes moderate. Antennæ very short, scarcely reaching to second

* I have placed this as a distinct species.

coxae, rarely beyond; of 5 segments; segment i. longer and wider than ii.; iii. about one-half of v.; v. with basal area about as long as iv. and as long as flagellum; 2 hairs on i.; 2 on ii., and 2 on iii.; 1 on iv. near apical sensorium; 1 on basal area of v. Rostrum short and broad, reaching to second coxae. Cornicles raised well above surface and the mouth circular. Anal plate broadly rounded, with a few short hairs. Cauda more or less

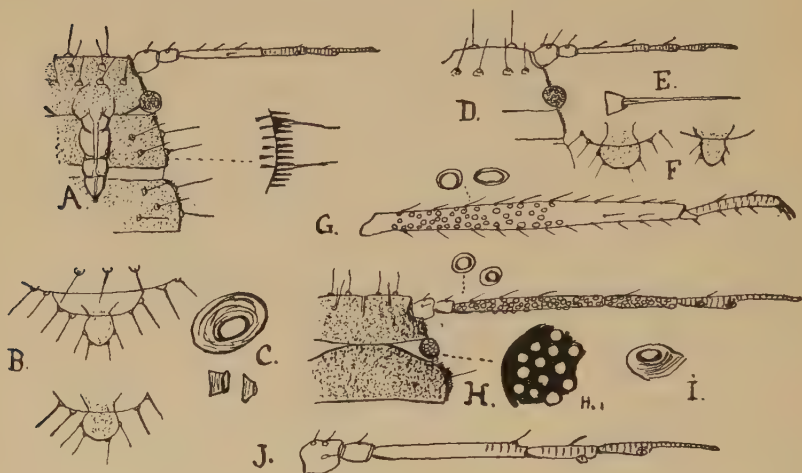


Fig. 1.—*Siphia schoutedeni* Del Guercio.

A. Head, etc. of apterous viviparous ♀; B. Cauda; C. Cornicles; D. Head, etc. of oviparous ♀; E. Body hair; F. Cauda; G. Hind tibia and tarsus; J. Antenna; H. Male head and antenna; H.1. Eye; I. Cornicle.

projecting, constricted at about one-half its length, varying from almost conical to knob-shaped, with a few long hairs. Legs rather short, thick and stiff. Eyes with round facets.

Length 1.9 to 2 mm.

Oviparous female. Apterous. Yellow-green to bright green, some marked with brown, especially at the segmental divisions of thorax and abdomen and a dark spot each side of prothorax. Antennae short, ochreous, apex of segment iv. and all v. dark. Cornicles slightly projecting; brown to pale brown. Legs ochreous-brown to brown. Rostrum ochreous

to yellow, apex dusky. Cauda green to dusky ochreous. Venter green to pale green. Head and body with spinose skin and stiff hairs. Head broad, flat, with two prominent hairs and some smaller ones in front and four in a more or less regular row behind. Antennæ not quite reaching the second coxæ, of 5 segments; i. much larger than ii.; iii. longer than v.; iv. less than one-half of iii.; v. with flagellum slightly longer than basal area; i. with 3 hairs; ii. with 1 hair; iii. with 1 to 2; iv. with 1 and a circular sensorium; basal area of v. with 1 small hair. Cauda constricted, but not actually knob-shaped, with 4 hairs; in some the cauda is bluntly triangulate. The cornicles arise from slight cones, circular at apices and surrounded by a brown patch basally. Legs short and thick; hind tibiæ not much enlarged, with short hairs and many oval and irregularly oval sensoria on basal three-fourths. Body hairs spine-like and arise from marked tubercles.

Length .9 to 1.5 mm.

Male. Apterous. Varying from greenish-brown to dull reddish or pinkish-brown; spaces between the segments are paler, usually green or greyish-green and in many are long dark spots. Venter greenish to dull greenish-grey. Legs brown; tibiæ dull ochreous to brownish. Antennæ thick, except segment v.; about one-half length of body; segment i. wider than ii.; iii. thick, as long as iv. + v., with many round, irregular sensoria; iv. about one-half of iii., with 20 to 30 sensoria; v. much narrower, its basal area as long as or slightly shorter than flagellum. Rostrum broad and thick, reaching to second coxæ. Cornicles arise from marked small cones. Legs longer than in the much larger oviparous female. As in other forms the body has long spine-like hairs and densely spinose skin.

Length .7 to 1 mm.

FOOD PLANTS. *Glyceria fluitans*; *Glyceria maritima*; *Holcus mollis*; *Aira sp.*; *Phalaris arundinaceæ*; *Poa annua*; *Poa aquatica*; *Juncus lampocarpus*; *Trifolium repens*; *Lotus corniculatus*; and other grasses.

LOCALITIES. Catacol, Arran, ix. 1900 (Waterston); Inver-shin, N.B., xi. 20 (Jackson); Great Salkeld, 14 x. 12 (Britten);

Ellerbeek, Crook, Kendal, vii. 14 (Rymer Roberts); Ashern, Yorks, ix. 27 (Dallman); Lymington, Hants, viii. 15; Wye, 7 x. 11 and 1 vii. 14 (F.V.T.); Woking, Surrey; Nelson, Lancs.; Burton Point, Cheshire (Laing); Morningside, N.B., i. 21; Roslin, Midlothian, v. 22; Balerna, Midlothian, xi. 21 (Evans); Anglesey, viii. 23; Bangor (Walton); Leeds (Taylor); Belgium (Schouteden); Holland (V. d. Goot); Italy (Passerini, Del Guercio, etc.); Germany; Russia; America (Patch).

Observations. I have only seen one species of *Sipha* from Great Britain which is of general occurrence; this certainly answers to Kaltenbach's description of *Aphis glyceriæ* (Mono. Pflanz. 113, 87), which was found on *Glyceria fluitans*, *Poa annua*, *Phalaris arundinacea* and *Juncus lampocarpus*. He describes both alate and apterous females. In 1900 Del Guercio described a *Sipha* from *Holcus* sp., as *Sipha schoutedeni*, and again details it with excellent figures in Redia II., 132, Tav. XIII., figs. 1-6, 1905. In this paper he tabulates seven species and marks off his *S. schoutedeni* as "Feminina vivipara attera uniformemente spinolosa gi atte" and from the others "Feminina vivipara attera non spinolosa." Kaltenbach's *glyceriæ* is placed in the latter section, "Corpo di color verde opaco con una linea medio dorsale pallida" and he then describes a variety of the same which as placed in his table reads: "Corpo di color verde uniforme senza la linea media dorsale pallida." I can see no valid reasons for not taking our species to be *glyceriæ*, but until things are more fixed I have adopted Del Guercio's definition. The insects I have previously recorded as *glyceriæ* are now placed under *schoutedeni* and from a note sent me by Mr. F. Laing all Walker's records of *glyceriæ* are the same. Van der Goot's *Sipha glyceriæ* is also evidently Del Guercio's *schoutedeni*. No smooth skinned *Sipha* has yet been found in Great Britain that would apply to Del Guercio's *glyceriæ* of Kaltenbach. Mordwilko (Bull. Ent. Res., XIII., 31, 1922) places this species as *glyceriæ* and sinks Del Guercio's name *schoutedeni* as a synonym. The shape of the cauda varies even in specimens from the same leaf, in some it is knobbed, in others partially knobbed and some have it almost conical. The sexuales occur in October and November and lay their eggs on the grass leaves, often in lines, end to end. One apterous viviparous female I found on *Lotus corniculatus* was evidently a vagrant. It was found by Evans in numbers on *Lotus* and *Trifolium*.

SIPHA LITTORALIS Walker.

Aphis littoralis Walker.

Walker, Ann. Mag. Nat. Hist. (2) II., 44 (1848); Laing, Ent. Mo. Mag., LVII. (third Se. VII.), 119 (1921).

Walker's original description is as follows: Apterous ♀. Flat, somewhat long and narrow, dark green, rarely pale green, no hairs or bristles, pale velvet-like down. Antennæ one-fifth length of body. Legs dull yellow and very short, feet black. Oviparous ♀ the same. Male, Apterous. October. Brown. Antennæ half body. Cornicles even with body. Late in autumn. Frequently submerged and often covered with clay.

"On grass of muddy seashore near Lancaster."

Laing, in re-describing the type gives the following characters: "Antennæ yellow, black towards the tip; 5 segmented; segments i. and ii. equal; iii. twice the length of ii.; iv. one-third the length of iii., with a rather large, primary sensorium at distal end; v. base twice the length of iv., spur just about equal to the length of the base, with two short strong spines at the tip, spur distinctly imbricated, primary sensorium large, compound. Total length, .44 mm. (i.e., just reaching the hind margin of the prothorax), the proportions of the segments being 15, 15, 28, 10, 20 + 20. Head, front distinctly conical, whole spinulose, length equal to length of first three segments of the antennæ. Rostrum green, dark at the tip, reaching the mid coxæ, tip bluntly conical, with two hairs on either side. Prothorax spinulose, devoid of any larger spines; mesothorax uniformly covered with minute spines, with a few longer spines interspersed; metathorax with localised spinulose areas, often chitinised, with one or two large spines in their midst, the proportions of the head and three thoracic segments being 60, 51, 75, 48. Abdomen with small more or less chitinised areas bearing minute spines, and at least one large spine, a few still larger spines along the margin and towards the apex of the abdomen; the general shagreen visible with very great difficulty, even in stained specimens. Cornicles very short, little more than tubercles. Cauda knobbed. Legs dull yellow; tarsi black, robust, the length of the hind coxa, .32 mm., tibia, .38 mm., tarsi, .16 mm.

Length 1.7 mm., breadth .9 mm.

This species according to Laing is easily separated from *S. schoutedeni* Del Guercio by the localised spinulose areas on the abdomen. The insect is only known from Walker's original material in the British Museum.

Mr. Laing recently records it from Burton Point, Cheshire, 2 viii. 26 on *Glyceria maritima*, found by Mr. Britten and from Hinksey, Berks., 9 x. 22, taken by Mr. O. W. Richards.

Genus CHAITOPHORUS Koch.

Tranaphis Walker.

Arctaphis Walker.

Eichochaitophorus Essig.

Micrella Essig.

Koch, Die Pflanz. i. (1854); Gerstaecker, Berich. 162 (1854); Passerini, Gli Afidi (1860); Walker, Zoologist, 1999 (1870); 2000 (1870); Buckton, Mono. Brit. Aphid., II., 120 (1877); Essig, Pomona Coll. Journ., IV., 721 (1912); idem, 716 (1912); Van der Goot, Beit. Z. Kennt. d. Holl. Blattläuse, 352 (1915); Baker, Bull., 826., U.S. Dep. Agric., 33 (1920).

Antennæ, body and legs hairy or bristly. Cornicles short, but prominent, truncate. Antennæ of six segments, with round sensoria in alatae. Cauda distinctly knobbed; anal plate rounded, both hairy. Legs normal. Antennæ shorter than body in both alatae and apterae. Wings normal. Males as a rule alate, now and then apterous. Oviparae apterous. Ocular processes distinct.

The type of Koch's genus *Chaitophorus* (1854) was set by Gerstaecker in 1856, Linnæus' *Aphis populi* being taken as the type. Walker erected the genus *Tranaphis* with his *salicivorus* as type, so that it sinks as a synonym as it resembles *populi* so closely. Baker points out that the types of both Essig's genera differ little from *populi* and the specimens I have from America certainly show little structural difference from the European *populi*. Walker's *Arctaphis* was founded on *populi*. *Chaitophorus* has usually included Linnæus' *Aphis aceris* owing to Passerini having taken this as the type of Koch's genus, evidently not knowing that Gerstaecker had previously set the type as *populi*. Buckton and others followed Passerini. There is much difference between *populi* and *aceris*, the latter coming with other species in Van der

Hoeven's genus *Periphyllus*, a marked genus, but the species of which are difficult to fix. The following species of *Chaitophorus* occur in Great Britain :

1. *Chaitophorus populi* Linnæus.
2. *Chaitophorus salicivorus* Walker.
3. *Chaitophorus vitellinæ* Schrank.
4. *Chaitophorus tremulæ* Koch.
5. *Chaitophorus abnormis* Theobald.
6. *Chaitophorus betulinus* V. der Goot.
7. *Chaitophorus betulæ** Buckton.
8. *Chaitophorus leucomelas* Koch.
9. *Chaitophorus capreæ* Koch.

The FOOD PLANTS are :

<i>Avena fatua</i>	<i>C. salicivorus</i> Wlk.
<i>Betula alba</i> etc.	<i>C. betulinus</i> V.d.Gt.
„ <i>alba</i>	<i>C. betulæ</i> Buckton.
<i>Dactylis glomerata</i>	<i>C. salicivorus</i> Wlk.
<i>Lactuca maritima</i>	<i>C. abnormis</i> Theo.
<i>Populus alba</i>	<i>C. populi</i> Linn.
„ <i>dilatata</i>	<i>C. populi</i> Linn.
„ <i>italica</i>	<i>C. populi</i> Linn.
„ <i>nigra</i>	<i>C. populi</i> Linn.
„ „	<i>C. leucomelas</i> Koch.
„ <i>tremulæ</i>	<i>C. tremulæ</i> Koch.
„ „	<i>C. betulinus</i> V. d. Goot.
„ „	<i>C. populi</i> Linn.
„ <i>domesticus</i>	<i>C. populi</i> Linn.
<i>Salix alba</i>	<i>C. salicivorus</i> Wlk.
„ <i>babylonica</i>	<i>C. vitellinæ</i> Sch.
„ <i>capreæ</i>	<i>C. vitellinæ</i> Sch.
„ „	<i>C. salicivorus</i> Wlk.
„ „	<i>C. capreæ</i> Koch.
„ <i>cinerea</i>	<i>C. salicivorus</i> Wlk.
„ <i>lapponica</i>	<i>C. salicivorus</i> Wlk.
„ <i>nigricans</i>	<i>C. vitellinæ</i> Sch.
„ <i>viminalis</i>	<i>C. salicivorus</i> Wlk.
„ <i>vitellinæ</i>	<i>C. vitellinæ</i> Sch.

* This will be described in the Appendix.

CHAITOPHORUS POPULI Linnæus.

Aphis populi Linnæus.*Aphis salicti* Schrank.*Aphis populeti* Panzer.*Arctaphis populi* Walker.*Myzaegirus* Amyot.*Chaitophorus salicti* Passerini.*Chaitophorus populialbæ* Boyer.*Chaitophorus populi* Koch.

Linnæus, Syst. Nat., II., 736, 27 (1768); Fn. Suec. 997 (1789); Reaumur, Ins., III., pl. 26, figs. 7-11 (1737); pl. 27, figs. 1-14; De Geer, Ins. III., 94, 15, pl. 7, figs. 1-7; Fabricius, Sp. Ins. II., 386, 22 (1781); Mant, Ins. II., 326, 27 (1787); Ent. Syst., 216, 27 (1794); Schrank, Fn. Boic., II., 1, 113, 1211 (1801); Fabricius, Syst. Rhyng., 298, 27 (1803); Panzer, Fn. In. Germ. I., 440, 6 (1801); Hausmann, Illig. Mag. I., 443, 6 (1802); Samouelle Compend., 1, 21 (1824); Boyer, Ann. Soc. Ent. Fr., x., 187, 29 (1841); Kaltenbach, Mono. Pflanz., I., 126, 98 (1843); Walker, Ann. Nat. Hist. Se. 2, I., 445, 19 (1842); List Homop. (B.M.), IV., 948 (1852); Koch, Die Pflanz., 12, pl. iii., figs. 16, 17 (*populi*); (1857); Passerini, Aphid. Ital., 57 (1863); Walker, Zool., 28, 2000 (1870) (*Arctaphis*); Buckton, Mono. Brit. Aphid. II., 140. Pl. LXXXII., figs. 3-5 (1877); Witlaczil, Denks. Akad. Wiss, Wein, XLVIII., 387, pl. i. ii. (1884); Schouteden, Mém. Soc. Ent. Belg. XII., 213 (1906); Van der Goot., Holl. Blattläuse, 362 (1915).

Alate viviparous female. Green; head and thorax black; body with varied black transverse bands. Antennæ ochreous; base and apex dark. Eyes deep red. Cauda green. Legs ochreous; apices of femora and tibiæ dusky, hind femora mainly dusky; tarsi dark. Rostrum reaching to third coxæ. Cornicles black. The whole body hairy. Head flat in front. Segment i. of antennæ darker than ii., a little wider, scarcely longer; iii. longest, not quite twice as long as iv., with 16 to 19 sensoria reaching nearly to apex; iv. longer than v.; base of vi. shorter than v.; flagellum about three times as long as base; hairs long and pallid. Rostrum green, apex black. Cornicles about as long as antennal segments i. and ii.; broadly expanded basally; apical half reticulate. Cauda knob-shaped, three long hairs apically and

other shorter ones. Anal plate rounded, green, with several long hairs. Body hairs arise from small tubercles on the dark lateral patches. In some specimens the fore legs show no dark femoral and tibial areas. Stigma brown; veins show a faint brown clouding.

Length 2. to 2.5 mm.

Apterous viviparous female. More or less broadened behind. Various shades of green and yellowish-green with dark green markings and mottlings. Antennæ green, except apices of segments and all vi. Legs same colour as body; tarsi dark. Cornicles green to smoky green. Cauda dusky green. Anal plate

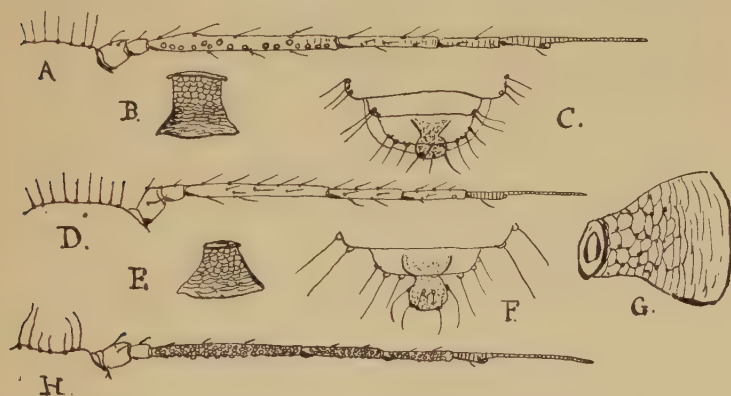


Fig. 2.—*Chaitophorus populi* Linnæus.

A. Alate ♀ Head and antenna; B. Cornicle; C. Anal plate and cauda; D. Head and antennæ of apterous ♀; E. Cornicle; F. Anal plate and cauda; G. Further enlarged cornicle; H. Male head and antenna.

green. Head with two long, fine hairs; body with long, thick, stiff hairs. Antennæ shorter than body; with rather long hairs; segment i. longer than ii.; iii. longest, nearly twice as long as iv.; iv. a little longer than v.; vi. with basal area a little more than one-half of v.; flagellum nearly three times as long. Rostrum green, reaching to second coxæ. Cornicles broadly expanded basally; apical half reticulate, remainder gradually merging into striæ. Cauda with four long hairs and some smaller ones, markedly knobbed. Anal plate rounded, with many hairs.

Length 2 to 2.5 mm.

Oviparous female. Apterous. Various shades of green, mottled with dark brown. Head, pronotum, parts of mesothorax and a broad, irregular stripe with ill-defined edge on abdominal segments on either side of median area, brown; the stripes often united anteriorly by a transverse band often more or less divided in middle and expanding posteriorly into large blotches surrounding the cornicles. Cornicles green to black. Apex of body often extended; greyish. Legs and antennæ dingy pale greyish-green, in some all dusky, or even black. Antennæ from

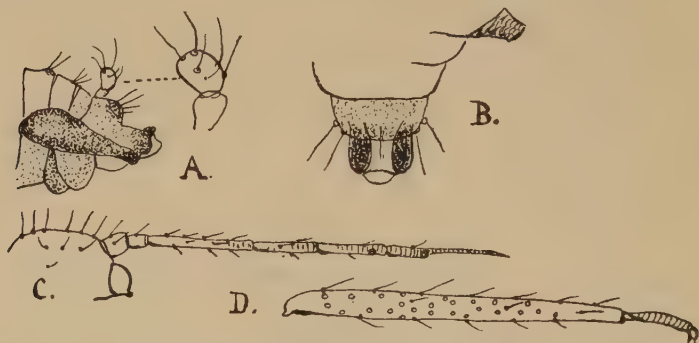


Fig. 3.—*Chaitophorus populi* Linnæus.

A. and B. Apex of ♂; C. Head and antenna of oviparous ♀; D. Hind tibia of oviparous ♀.

half to one-third length of body; segment i. larger than ii.; iii. longest; iv. and v. about equal, in some the latter slightly the longer; vi. with base about half flagellum; a few long hairs on all segments. Hind tibiæ slightly dilated, with many small round pale sensoria and long hairs.

Length 2 mm.

Male. Alate. Brownish-black, yellow rings on abdomen or abdomen nearly all yellow. Antennæ greyish-ochreous, paler towards base and greenish towards apices; base darker. Fore legs pale dingy green to greyish yellow; tarsi dusky; second and third legs similar, but femora dull greyish-brown. Cornicles deep green to yellowish-green, in a few deep brown. Antennæ as long as body; segment i. much larger than ii.; iii. longest, with 40-70 small round sensoria over its whole length; iv. longer than v. with 38 to 40 sensoria; v. with 11 to 27; base of vi. about one-third of flagellum. Hairs on head and body long. Cornicles

with dark apical reticulation. Genitalia marked (*vide* fig. 3). Wings large; veins brown.

Length 2 mm.

Apterous male. Antennæ much longer than body; iii. with 11-18 sensoria, none near base, iv. with 20-22, all over it; v. with 16-18. Rostrum to second coxæ.

Length 1 mm.

FOOD PLANTS. *Populus alba*; *P. nigra*; *P. italica*; *P. tremulæ*; *P. dilatata*; *Prunus domesticus* (Buckton).

LOCALITIES. Wye; Cambridge, vii. 97; St. Neots, vi. 99; Great Staughton, Hunts., vii. 99; Freshwater, Isle of Wight, 21 viii. 15; Brockenhurst, 20 viii. 15 (F.V.T.); Windermere (Rymer Roberts); Great Salkeld, 17 x. 12 (Britten); Chichester, vi. (Buckton); Invershin, N.B., 14 ix. 20 (D. J. Jackson); Guildford; Bagshot; Oxshott; Kew; Staines; Chiltern Hills; Norwich; Birmingham; Dolgelly; Llangollen; Llanberis; Edinburgh; general throughout N.W. Scotland (Laing); Holland (V. d. Goot); Italy (Passerini); Bruges, Belgium, viii. 99 (F.V.T.).

Observations. This common Poplar Aphid is subject to much variation, especially in colour and markings of the apterous female. Buckton quotes it being taken in June "at Chichester by thousands, on the leaves and young shoots of the Garden plum; the shoots being encrusted for six or eight inches by the larvæ. A few scattered winged forms nestled under the leaves even at this early date." This is the only record I know of this species occurring on any other plant than *Populus*. Buckton also records varieties of the winged female as being black.

Walker's first variety of the apterous female is described as follows: "This is smaller than the preceding and when young is pale dull green with a bluish line on each side, oval, convex, slightly pubescent; the head, a large spot on each side of the fore chest, the feelers, the mouth, the nectaries and the legs are blackish-green; the feelers are less than one-third of the length of the body; the eyes are dark brown; the nectaries are not more than one-twentieth of the length of the body. In the beginning of June, when full grown, it is pale green, varied with vivid green and is hairy, oval and rather flat; the feelers are pale green, shorter than the body; their tips are brown; the eyes are black; the

mouth pale green ; its tip brown ; the nectaries are very short ; the legs are pale green and moderately long ; the feet and the tips of the shanks are brown. There are often two interrupted brown lines along the back ; these lines vary in breadth and distinctness and sometimes occupy the greater part of the back, they occasionally occur only on the head and on the fore part of the chest." He also describes a variety of the alate viviparous female as follows : " Smaller than preceding ; the abdomen and the underside of the fore chest are pale green ; the feelers are pale brown, pale green at the base and a little shorter than the body ; the mouth is pale green with a black tip ; the legs are pale green ; the wing-brands and the veins of the wings are brown."

This insect may be found on the Poplars all the year round and is especially noticeable from June on to September and October, when the sexuales occur in small groups below the leaves. The ova are laid close to a leaf-bud, each oviparous female producing from four to eight ova. The larvæ are at first almost white, mottled with green and surround the mother often in a patch as big as a sixpence. The nymphæ vary from yellow to dark brown, hairy, with red eyes ; in some the thorax is dull ochreous.

CHAITOPHORUS TREMULÆ Koch.

Koch, Die Pflanz., 8, 7, Pl. II., fig. 12 (1854) ; Schouteden, Mem. Soc. Ent. Belg., XII., 213 (1906).

Alate viviparous female. Head and thorax black ; collar green. Abdomen green with broad black median bars ; five black lateral spots and some small round black spots between them and the median bars ; a dark spot at base of cornicles. Antennæ dark except basal two-thirds of iii. Cauda and cornicles black. Front legs green, others dark. Long hairs on head and long ones from the black lateral spots. Antennæ not quite as long as the body ; iii. with 17-20 round sensoria, nearly twice as long as iv. ; iv. and v. about equal ; base of vi. two-thirds of v. ; flagellum three times length of base ; hairs few, rather long. Rostrum to second coxæ. Eyes large, black. Cornicles truncate, apices reticulate. Cauda with a few short hairs.

Length 2 mm.

Apterous viviparous female. Brown to dark brown, some specimens almost black ; fore and one or two posterior segments

with dull yellow lines and a median paler line; venter pale brown to olive-green; darker lateral patches. Antennæ yellow to reddish yellow on segment iii., remainder dusky. Legs reddish-yellow, mid and hind femora dark, also apices of mid and hind tibiæ; in some specimens the hind tibiæ all dark. Tarsi dark. Cauda, cornicles and anal plate dark. Body and head with long, simple hairs. Antennæ shorter than body; segment i. larger than ii.; iii. longer than iv., not quite so long as vi.; iv. a little longer than v.; vi. with basal area more than half of v. to nearly equal; flagellum three or more times length of base; i. with median circlet of a few long hairs; hairs fewer on ii.; iii. with three long hairs one side, two the other; iv. with four hairs near apex,

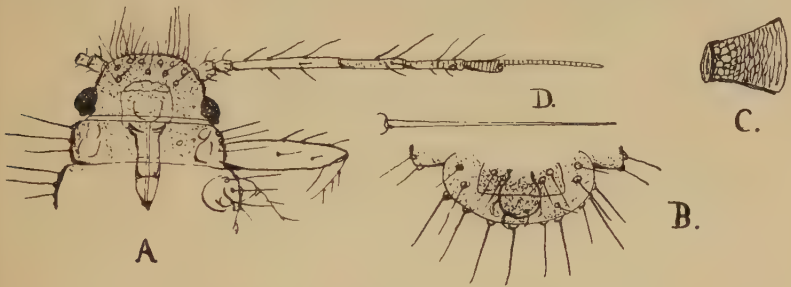


Fig. 4.—*Chaitophorus tremulæ* Koch.

A. Head, etc. of apterous viviparous ♀; C. Cornicle; B. Cauda and anal plate; D. Body hair.

one very long; vi. with one hair on basal area; v. with two long and one short hair. Cornicles small, truncate, cylindrical, more or less expanded basally, apex with large reticulations, narrowing to almost striæ basally. Cauda small, knobbed, seldom projecting from body, with a few thin, curved moderately long hairs. Anal plate somewhat squared at the sides and rather small; apical abdominal segment projecting beyond both. Body hairs long and thin, simple; apical ones thicker. Cephalic hairs in two tufts, long and thin. Cuticle finely spinose. Femora rather thickened, with a few fine long and short hairs. The dark lateral spots carry long hairs, which arise from distinct tubercles. Usually one long and two short hairs.

Length 1.5 to 2.0 mm.

FOOD PLANT. The Aspen (*Populus tremulus*).

LOCALITIES. St. Neots, Hunts., 27 viii. 99 ; Hastings, 14 viii. 02 ; Sandwich, ix. 22 (F.V.T.) ; Great Salkeld, 9 ix. 12 (Britten).

Observations. I have only seen the apteræ and only some rough field colour notes are available, so I append Koch's original description. It is remarkably hairy and dark. In balsam preparations the dark lateral spots show up very clearly and the markedly spinose nature of the cuticle is worthy of note.

Koch's description is as follows :—" Ihre Farbe ist ein tiepes Braun oder Schwarz, bei jüngeren olivenbraun und fleckig ; gewöhnlich sind die vordern und hintern Ringe gelblich geraudet, die übrigen mit einem hellern Streif der länge nach durchschmtten, der sich zuweilen mehr oder weniger in der Mitte erweitert und als dann ins gelbe übergeht. Die Unterseite ist düster oliven-grünlich. Fuhler und Beine sind rothlichgelb, bei manchen Stücken fleischrothlich, die Spitzen der zwei vorletzten Fühlerglieder und die Schenkel der Mittel und Hinterbeine Sammt den Hüften dunkelbraun oder schwarzbraun die Wurzel und Spitze der Schenkel aber wieden rothlichgelb, gar oft ist auch diese braune Schenkelfarbe sehr erloschen."

Van der Goot considers this to be *populi* Linn. (Holl. Blattläuse, 362).

CHAITOPHORUS SALICIVORUS Walker.

Aphis salicivora Walker.

Chaitophorus salicivorus Passerini.

Walker, Ann. Nat. Hist., I., 6, 453, 25 (1848) ; Passerini, Gli Afidi, 37 (1860) ; Aphid., Ital., 58 (1863) ; Walker, Zool., 28, 1999 (1870) (*Tranaphis*) ; Buckton, Mono. Brit. Aphid. II., 134, pl. lxxx., figs. 1-4 (1877) ; Ferrari, Aphid Liguriæ, 76, 82 (1872) ; Van der Goot, Holl. Blattläuse, 366 (1915).

Apterous viviparous female. Small and delicate, green of various pale shades to rusty red, with long fine hairs all over body ; oval, flattened. Head with long fine hairs. Antennæ shorter than body, same colour, apices dark. Cauda green. Anal plate green or reddish. Legs rather short and thick, same colour as body, except apex of tibiæ and the tarsi, which are brown. Rostrum green, apex black, reaching to second coxæ. Cornicles very small, truncate, green. Segment i. of antennæ larger than ii. ; iii. nearly as long as iv. + v., but shorter than vi. ; iv. and v.

about equal; vi. with basal area a little shorter than v., flagellum a little more than twice length of base; two longish, slightly capitate hairs on i., one on ii.; a few short pale ones on remainder. Rostrum reaches just past second coxæ, in some almost to third, narrow. Cauda knob-like, with very short stalk; three long hairs each side and one or two on surface. Anal plate rather flattened, with long hairs. Cornicles short and truncate, varying in length, imbricate, in some almost with circular striæ. Hairs of head simple, most of those on body with furcate apices. Legs

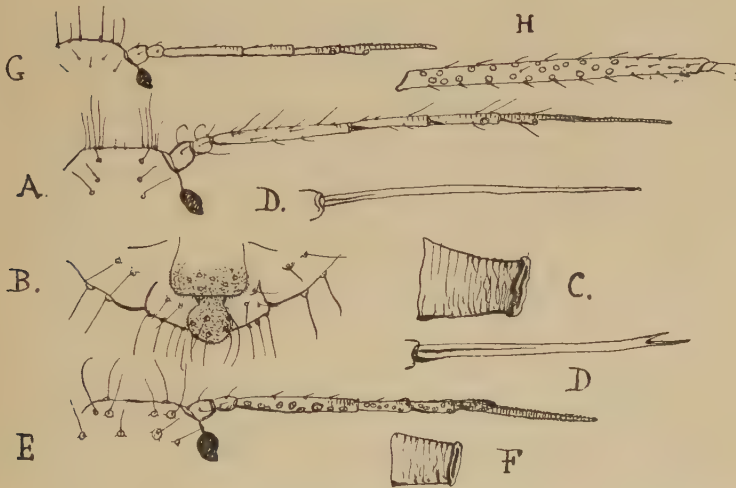


Fig. 5.—*Chaitophorus salicivorus* Walker.

A. Head and antenna of apterous viviparous ♀; B. Anal plate and cauda of apterous ♀; C. Cornicle; D. Body hairs; E. Male antenna; F. Male Cornicle; G. Head and antenna of oviparous ♀; H. Hind tibia of oviparous ♀.

rather short and fairly thick, same colour as body; tarsi dusky; a few short hairs on femora, fore and mid tibiæ, more on the hind; two hairs on first tarsal segment.

Length 1 to 1.2 mm.

Oviparous female. Apterous; flattened, with many long hairs; bright yellow to greenish yellow, in some cases tinged with rusty-red. Antennæ and legs a little paler than body. Cornicles same colour as body. Eyes black. Anal extremity produced. Hind tibiæ not dilated. Antennæ less than half of body; segment i.

larger than ii. ; iii. longer or as long as iv. + v. ; iv. and v. about equal ; vi. with basal area shorter than v. and about one-third length of flagellum ; iii. with two stiff hairs ; iv. with one near apex, also v. Hind tibiæ slightly enlarged, but narrower than femora, with small sensoria over whole surface to near apex and with small but prominent hairs. Body hairs simple. Cauda knobbed, with a few hairs. Anal plate rounded. Body showing some lateral tubercles.

Length 1 mm.

Male. Apterous. Small, somewhat linear. Antennæ from about half to nearly the length of body, according as to whether the male is *in copulâ* or not ; segment i. larger than ii. ; iii. about as long as iv. + v., a little shorter than vi., with 9 to 12 rather irregularly-shaped round sensoria ; iv. a little longer, and slightly thicker than v., with 5 to 6 sensoria ; v. with 2 to 4 sensoria, and usual primary one ; vi. with basal area smaller than v. and about one-third length of flagellum. Head broad, with long hairs. Eyes large. Rostrum reaches to second coxæ. Legs rather thick, tibia with hairs. Cornicles short, dark, cylindrical, truncate. Cauda knobbed. Body hairs furcate.

Length .7 mm.

FOOD PLANTS. *Salix viminalis* ; *S. capreæ* ; *S. cinerea* ; *S. lapponica* ; *S. babylonica* ; *Avena fatua* ; *Dactylis glomerata*.

LOCALITIES. Wye ; Lymington ; Hastings ; Battle ; Cambridge ; Exeter ; Okehampton ; Selby ; Panton, Lincs. ; Criccieth, N. Wales (F.V.T.) ; Lyndhurst ; Guildford ; Oxshott ; Cambridge ; Chiltern Hills ; Birmingham ; Dolgelly ; Llangollen (Laing) ; Great Salkeld, Cumberland (Britten) ; Windermere (Rymer Roberts) ; Aber, N. Wales (Walton) ; Holland (V. d. Goot).

Observations. This small Aphid often occurs in great numbers under *Salix* leaves, especially I find on the Goat Willow (*Salix capreæ*). The apteræ occur from May onwards and in October and November apterous males and females may be found in small numbers, usually in copulâ. Walker (1848) says : " Sometimes above 800 insects of this species feed together under a single leaf of a willow, *S. capreæ*, from the beginning of May till the end of October, the latter month being the time for the appearance of

the male and oviparous female." I have not found alate viviparous females, but have a slide of nymphæ taken in July. Ferrari records it on *Avena fatua* in May and on *Dactylis glomerata* in Italy. It closely resembles *vitellinæ* Schrank, but the latter has dark cornicles. At present I am keeping this and *vitellinæ* separate.

CHAITOPHORUS VITELLINÆ Schrank.

Aphis vitellinæ Schrank.

Schrank, Fn. Boica, II., 103, 1178 (1801); Ferrari, Aphid. Liguria, 76, 83 (1872); Schouteden, Aphid. Belg. 213, 3 (1906); Buckton, Mono. Brit. Aphid. II., 136, Pl. lxxxi., figs. 1-2 (1877).

Apterous viviparous female. Green to yellowish-green, often a very vivid green, with various darker green markings, frequently as two irregular lines or as an irregular forked area on the back; some mottled. Head somewhat darker, in some cases brownish-green. Antennæ green, dark apically. Legs green with dark tarsi. Cornicles dark, varying from brown to black. Body and head with long hairs which are not furcate as in *salicivorus*. Antennæ of six segments shorter than body; segment i. larger than ii., with two curved hairs; ii. with one curved and one short straight one; iii. longer than iv., but not quite so long as vi., with three long and many short hairs; iv. about as long as v., with a simple long hair near apex; v. with two near apex; vi. as long as iv. + v.; basal area less than one-third of flagellum. Head broad, with a tuft of long hairs each side; rostrum short, rather broad, reaching to second coxæ. Cornicles dark, short, truncate, basally expanded and with irregular striæ, in some cases almost linear; reticulate near apex. Cauda knob-shaped, dusky, with four long hairs; scarcely projecting from body. Anal plate more or less rectangular. Body hairs numerous of two sizes, none furcate. Legs hairy.

Length 1.7 to 1.9 mm.

FOOD PLANTS. *Salix capreæ*; *S. nigricans*; *S. vitellinæ*; *S. alba*.

LOCALITIES. Wye, 10 viii. 07; Sandyhurst, Ashford, x. 26 (F.V.T.); Great Salkeld, ix. 14 (Britten); Oxshott and along the

Thames Valley (Laing); Hastings, viii. 11; Wimbledon; Wandsworth, 17 viii. (Buckton); Germany (Koch); Italy (Passerini and Ferrari); Belgium (Schouteden).

Observations. Closely related to *salicivorus*, but it is larger and can be at once demarked by the cornicles which are dark and in the apterous viviparous females the hairs are simple and not bifurcate at apices. It does not seem to be common in Great Britain.

CHAITOPHORUS ABNORMIS Theobald.

Ent. Mo. Mag., LXI., 80 (1925).

Alate viviparous female. Antennæ shorter than body; hairy; segment i. larger than ii.; iii. much longer than iv., with 9 to 10 round sensoria, extending from near base to apex; iv. a little

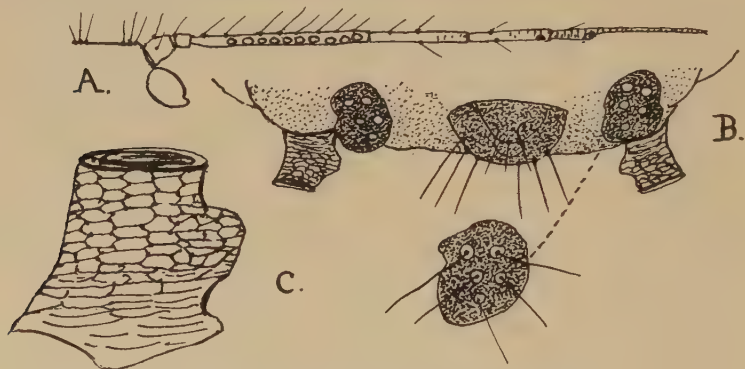


Fig. 6.—*Chaitophorus abnormis* Theobald.

Alate viviparous ♀; A. Head and antenna; B. Cornicles, etc.; C. Further enlarged cornicle.

longer than v.; flagellum of vi. about twice as long as basal area. Head flat in front, with three to four long hairs each side. Eyes large and red. Cornicles short and thick, with a blunt knob-like process on the inner side; apical half reticulate, the reticulations widening laterally towards base. Anal plate large, rounded. Cauda knobbed, small, hidden under anal plate. Long hairs on the abdomen. Legs rather short and thick, with long outstanding hairs. Head, pronotum and thoracic lobes dark; dark median bars on abdomen; large dark lateral spots, the largest at the base of cornicles, from which arise long hairs from

small pale spots ; small black spots also between the large lateral spots and the median bars.

Length 2 mm.

FOOD PLANT. *Lactuca muralis*.

LOCALITY. Flintshire, ix. 24.

Observations. Described from a perfect specimen and some immature larvæ taken by Mr. A. Dallman in company with Buckton's *Macrosiphum muralis*. It is at once demarked by the abnormal cornicles.

CHAITOPHORUS LEUCOMELAS Koch.

Chaitophorus versicolor Koch.

Koch, Mono. Pflanz., 4, figs. 5 and 6 ; 10, figs. 14, 15 (1854) ; Buckton, Mono. Brit. Aphid., II., 135, Pl. LXXX., figs. 5, 6 (1877) ; Van der Goot, Holland. Blättlause, 356 (1915).



Fig. 7.—*Chaitophorus leucomelas* Koch.
Alate viviparous ♀.

Alate viviparous female. Head black ; pronotal band and thoracic lobes black ; abdomen green to dirty yellow, with large black median bars ; antennæ dark except segment ii. and basal

two-thirds of iii. which are green ; cornicles and knobbed cauda black ; legs green, part of mid-femora and most of the hind dark, also mid and hind coxæ ; rostrum green, apex dusky. Antennæ a little shorter than body ; i. larger than ii. ; iii. longer than iv., with 14-16 round sensoria to apex, with four long hairs one side ; iv. longer than v., with three long hairs one side, three short ones the other, sensoria 0-1 ; v. with two long hairs one side, one short one the other ; flagellum pale, about four times length of base. Head with several long hairs. Rostrum thick, reaching to or not quite to second coxæ. Body hairy, long ones from the dark lateral spots. Cornicles short, truncate, apices reticulate. Cauda with



Fig. 8.—*Chaitophorus leucomelas* Koch.
(*versicolor*) Apterous viviparous. ♀.

some longish hairs, also the pale anal plate. Femora and tibiæ with longish outstanding hairs. Wings with dark brown stigma and veins, the latter slightly dusky at the borders.

Length 2 mm.

Apterous viviparous female. Pale green to pale yellowish green or yellow ; two brown areas on pronotum, two large ones on mesonotum and brown areas each side down the abdomen, some much darker than others. Antennæ pale ; segment i., apex of iii. and most of vi. dusky. Legs same colour as body ; tarsi dusky. Eyes red. Rostrum same colour as body. Cauda

smoky. Cornicles black, apices reticulate. Cauda with four long and some smaller hairs, knobbed. The whole head, antennæ, body and legs hairy, hairs long.

Length 2 to 2.3 mm.

FOOD PLANT. Poplars (*Populus nigra*).

LOCALITIES. Brenchley, Kent, 20 vii. 25 (Wimshurst) ; Wye, 7 viii. 20 (F.V.T.) ; Haslemere, vii. (Buckton).

Observations. Apparently an uncommon species. The long hairs and body markings of the apteræ demark it from *populi* and the shorter rostrum in the alatæ. Van der Goot also places Koch's *capreæ* as a synonym, it seems distinct to me. Koch's *versicolor* is apparently a pale form of *leucomelas* as seen in the apteræ. The pale alate female figured by Buckton is evidently an immature specimen. The apteræ often occur in numbers together under a leaf and may cause a slight blistering of the leaf.

CHAETOPHORUS CAPREÆ Koch.

Koch, Mono. Pflanz., 6, figs. 8, 9 (1854) ; Buckton, Mono. Brit. Aphid. II., 136, Pl. LXXXI., figs. 1, 2 (1877) ; Schouteden, Mém. Soc. Ent. Belg., XII., 213, 3 (1906).

Apterous viviparous female. Bright green, yellowish-green to yellow with variable dark marks on the body, sometimes as a series of dark spots each side, others with a dark forked mark in front. Head darkened, sometimes all over, at others only in front. Eyes red. Antennæ with segments iv. to vi. dark. Cornicles small, dusky. Cauda dusky. Rostrum green. Legs green ; tarsi dusky. Antennæ short, not more than half-length of body ; segment i. much larger than ii. ; iii. about one and one-third longer than iv. ; iv. and v. about equal ; base of vi. about two-thirds of v. ; flagellum longer than iii. Rostrum to second coxæ. Cornicles very small, about size of antennal segment i., faintly ornamented. Cauda knob-like, with 4 hairs. Antennæ with very few hairs. Head with a tuft of long hairs each side in front. Body with long lateral hairs, more or less in groups and a few on the dorsum. Legs rather short and thick, with long outstanding hairs one side of tibiæ, shorter ones the other.

Length 1.5 to 1.6 mm.

Male. Apterous ; small ; more or less linear, very hairy. Greenish-brown to brown, head and pronotum darkened. Antennæ brown, except base of iii. Rostrum pallid. Eyes red. Legs dusky, fore pair palest ; tarsi dark. Antennæ about half length of body ; segments i. and ii. very dark ; iii. nearly twice length of iv. ; iv. a little longer than v. ; vi. with base nearly as long as v. ; flagellum shorter than iii., a little more than twice base of vi. ; iii. with 7-10 sensoria ; iv. with 6-8 ; v. with 3-5 + 1. Rostrum reaches second coxæ. Cornicles very small, striate ; almost cylindrical. Knobbed cauda with 4 hairs. Head with long, thick, stiff hairs, arising from large pale areas showing marked double contours. Body with long, thick, stiff hairs, mostly simple, a few furcate ; those on the dorsum in a more or less regular line on each segment, more numerous and irregularly placed on the thorax ; all arising from large, round pale areas with distinct double contours. Legs rather short and thick, a few pale hairs on the tibiae.

Length 1 mm.

FOOD PLANTS. *Salix viminalis* : *S. caprea* ; *S. nigricans*.

LOCALITIES. Great Salkeld (Britten) ; Guildford (F.V.T.) ; Wimbledon ; Wandsworth, 17 viii. (Buckton) ; Belgium (Schouteden) ; Italy (Passerini).

Observations. Found as isolated specimens beneath the leaves. I have never been able to obtain any alatae, nor oviparae. The males are very marked, the long stiff hairs arising from large pale areas being very characteristic. According to Buckton, Passerini found it within the reflexed margin of the *Salix* leaves, "in montibus prope Berceto." Van der Goot places it as a synonym of Koch's *leucomelas*, it is certainly very distinct.

CHAITOPHORUS BETULINUS V. d. Goot.

Van der Goot, Mitteilungen aus d. Natur hist. Mus. XXIX., 276 (1912) ; Holl. Blattläuse, 354 (1915).

Alate viviparous female. Deep greenish-brown ; head and thorax black ; abdomen with eight broad black median transverse bars, black lateral spots and some small black spots between a black patch at base of cornicles. Antennæ deep brown, except ii. and base of iii., which are the colour of body. Rostrum

greenish-brown, apex dark. Legs deep greenish-brown to black ; hind pair darkest. Cornicles and cauda dark. Stigma and veins deep brown, latter very faintly tinged along borders. Head, antennæ and body with rather long hairs. Antennæ shorter than body ; i. larger than ii. ; iii. longer than iv., equal to vi., with 32-36 sensoria, mainly along one side ; iv. a little longer than v. ;

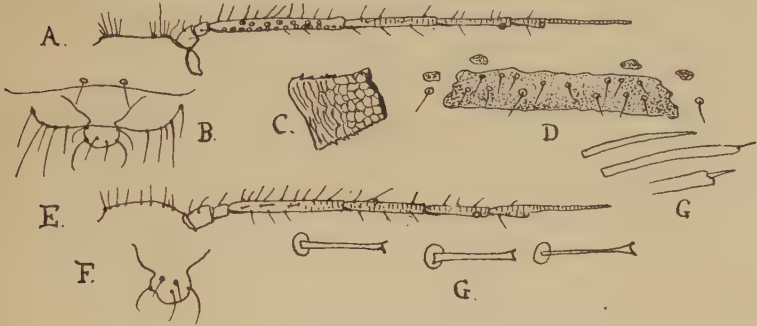


Fig. 9.—*Chaitophorus betulinus* V. d. Goot.

A. Alate ♀ head and antenna ; B. Cauda, etc. ; C. Cornicle ; D. Pigmented abdominal bar ; E. Apterous ♀ head and antenna ; F. Cauda ; G. Body hairs.

base of vi. half of v. ; flagellum twice as long as base ; hairs outstanding. Rostrum reaches to second coxæ. Cornicles short and thick, truncate, apices reticulate. Legs with outstanding hairs. Cauda with a few hairs, knobbed ; anal plate quadrilateral, with a few hairs.

Length 2 to 2.4 mm.

Apterous viviparous female. Black to deep brown. A yellowish brown or dull ochre area at base of abdomen in some, others show a general dark ochre colour with broad dark bars, usually merging into a dark patch posteriorly, some all black. Antennæ deep brown ; ii. and base of iii. yellow brown. Legs deep ochre brown to brown, fore and mid tibiæ deeper at base and apex. Body with dark hairs, some narrow and thin, others thick, with sharp points. Antennæ shorter than body ; i. larger than ii. ; iii. as long as iv. + v., longer than vi. ; iv. longer than v. ; vi. with base half of v. ; flagellum twice as long as base ; hairs outstanding. Rostrum reaches to third coxæ or past. Cornicles dark, short, apices reticulate. Cauda with two long and other

shorter hairs. Hairs of varied shapes, some thick with sharp points, others thin and normal. Legs with many outstanding hairs.

Length 1.8 to 2.2. mm.

Nymph. With many long and prominent furcate hairs; colour dark.

Larva. Very similar with thick, simple and furcate hairs over body, arising from dark spots; numerous short, fine hairs on apex.

Oviparous female. Apterous, deep brown. Antennæ not half length of body; segment i. wider but no longer than ii., iii. about as long as vi. and much longer than iv., iv. and v. about equal; base of vi. more than half v., and less than half flagellum; rostrum narrow, reaching to third coxæ. Body with rather long hairs and some on abdomen slightly forked or notched. Legs rather short and thick; hind tibiæ with many sensoria over whole length, not much wider than the femora.

Length 1.7 to 2 mm.

FOOD PLANTS. Birch and Aspen.

LOCALITIES. Shadoxhurst, near Ashford, Kent, vii., viii., ix., and x., 25 and 26; King's Wood, near Wye, x. 26 (F.V.T.); Cadnam, Hants (Laing); Holland (V. d. Goot).

Observations. Very abundant where found on both birch and aspen, especially on the tips of the shoots. It is much attended by ants. The colour varies a good deal, some being almost black. The furcate or ragged apex to the hairs is very marked.

Genus ATHEROIDES Haliday.

Haliday, Ann. Mag. Nat. Hist., II., 189 (1839); Walker, Ann. Mag. Nat. Hist., II., 45, 47 (1848); Cat. Homop. B. M., IV., 1, 953, 1168 (1852); Laing, Ent. Mo. Mag., LVI., 3rd Se., VI., 38 (1920); Baker, Bull. 826, U.S. Dep. Agri., 33, (1920).

Elongate and flat; prominently spined. Antennæ of five segments, armed with stout spines. Cornicles reduced to mere rings. Cauda broadly rounded. Fore wings with media twice branched; hind wings with both media and cubitus present.

All the species live on grasses and sedges. Four species occur in Great Britain.

1. *Atheroides serrulatus* Haliday.
2. *Atheroides brevicornis* Laing.
3. *Atheroides hirtellus* Haliday.
4. *Atheroides junci* Laing.

ATHEROIDES SERRULATUS Haliday.

Aphis serrulatus Walker.

Sipha paradoxa Theobald.

Haliday, Ann. Mag. Nat. Hist., II., 189 (1893); Walker, Ann. Mag. Nat. Hist. (2) II., 47 (1848); Theobald, Entomologist, XLI., 26 (1918); Laing, Ent. Mo. Mag. LVI. (3rd Se. VI.), 39 (1920) and LVII., 118 (1921).

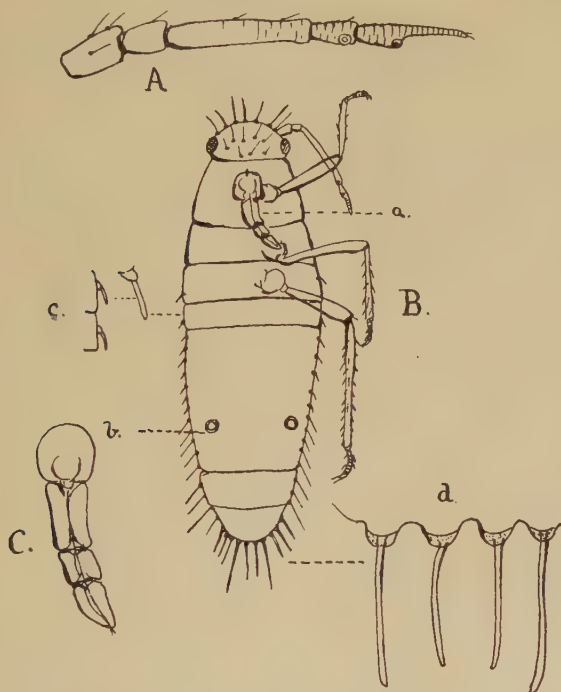


Fig. 10.—*Atheroides serrulatus* Haliday.

Apterous viviparous ♀; A. Antenna of larva; B. Adult; a, rostrum; b, cornicles; c, lateral hairs; d, apical hairs; e, Rostrum (further enlarged).

Apterous viviparous female. Usual colour on dorsum light ochreous-brown, or yellow to ochreous-brown, brown, or in some cases dark reddish-brown to almost black (the dark specimens appear to be parasitised); venter paler, light yellow or yellowish-green, a sharp line of demarcation between the dorsal and ventral surfaces. Dorsum of hard texture, with marked hairs. At apex of abdomen on the venter is a pale brown median spot on each of the last two segments. Eyes dark brown to black. Antennæ yellow, last segment darker. Legs yellow, apices of tibiæ and the tarsi dark. Apex of rostrum dark, remainder ochreous. Apex of body expanded with a semi-circular plate with crenulated edges bearing many bristles, same colour as dorsum of abdomen. Body elongate, narrow and rugose.

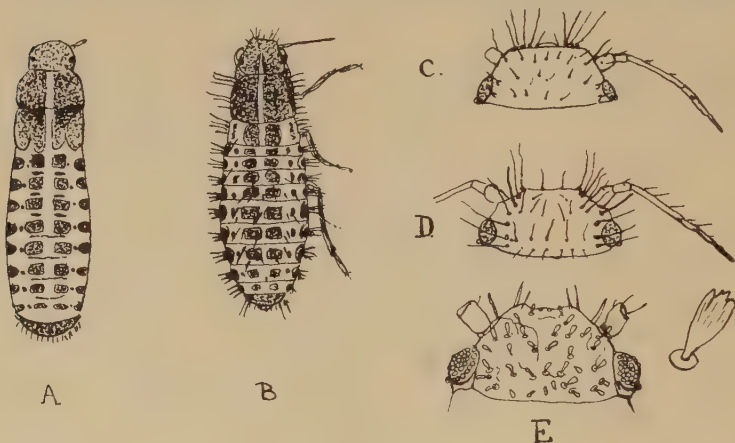


Fig. 11.

A. Larva of *Atheroides serrulatus*; B. *A. hirtellus*, young oviparous ♀; C. Head of *A. serrulatus*; D. of *A. hirtellus*; E. of *A. brevicornis* (C—E. after Laing).

Antennæ of five segments, very short, reaching to or nearly to, pronotum; segment i. wider than ii., with 2 long hairs and 1 shorter hair; ii. with 1 hair; iii. about as long as v., with 2 hairs on the side and 2 at apex; iv. about half of iii., with 1 hair near apex, in some specimens 4 smaller ones; v. a little longer than iii., but in young specimens shorter; flagellum a little longer than base. • Head more or less rounded with 8 thick hairs in front, shorter ones on crown. Pronotum and mesonotum wide, former usually

wider than latter. Metanotum narrower than mesonotum to nearly same size. Abdominal segments marked; first about equal to metanotum; apical segments marked and narrower than preceding with 10 long bristles; body, with short spines, a few longer ones near apex. Legs rather short; tibiæ with fine hairs, especially the hind ones. Cornicles as simple pores placed towards the anterior edges of abdominal segment v.

Length 2 to 2.3 mm.

Male. "Apterous; resembles the apterous female in shape and disposition of the spines very closely, but is considerably smaller, being but 1.5 mm. long by 0.4 mm. broad. Segment iii. of antennæ has about 25 sensoria, giving it a marked tuberculate appearance; segment iv. has about 10; the proportions are 30, 17, 76, 35 (26 + 50). (Laing.)"

Oviparous female. Laing describes this as follows:—"Resembles the viviparous female, except that the hind tibiæ have sensoria which take the shape of a figure of 8."

FOOD PLANTS. Various grasses, including *Poa trivialis*.

LOCALITIES. Rothamsted, 11 ix. 17 (Rymer Roberts); Inveran, Invershin, N.B. (D. J. Jackson); Belfast, 10 x. 47 (Walker, in Nat. Mus., Dublin); Guildford; Dawlish; Newton Abbot, Devon; Leeds; Staines; Birmingham district; Blair Atholl (B.M. Coll.).

Observations. This species lives on the blades of grasses, usually singly. The young forms are described by Miss Jackson as "light yellow or yellow, tinged with green, with dark brown or reddish-brown markings as figured. Legs brown, venter unicolorous." Rymer Roberts wrote me that the young seem to have the body constricted between the thorax and the abdomen and the abdominal segment much more defined.

The insect I described as *Sipha paradoxa* is certainly this species, which was then only known as a dried mass on a card and unidentifiable.

ATHEROIDES HIRTELLUS Haliday.

Aphis hirtellus Haliday.

Haliday, Ann. Mag. Nat. Hist., II., 189 (1839); Walker, Ann. Mag. Nat. Hist. (2), II., 45 (1848); Cat. Homop. B.M., I., 953, 1168 (1852); Laing, Ent. Mo. Mag., (Se. 3., VI. 42) (1920).

Apterous viviparous female. Brown, paler beneath, in some dusky yellowish green, very bristly. Elongate and linear, rather flat. Antennæ of 5 segments, very short, not reaching to posterior of pronotum, brown; apex of tibiæ and tarsi darker. Antennal segment i. much wider but no longer than ii, with 3 hairs; ii. with 1 and a minute hair near apex (Laing describes this as a sensorium); iii. about as long as v., with 4 to 5 long hairs; iv. about one-third length of iii., and slightly longer than ii., v. with flagellum a little longer than base, which has 1 long hair; a small one close to sensorium and 3 small apical spines (in some specimens v. is longer than iii.). Head much more hairy than in *serrulatus*,

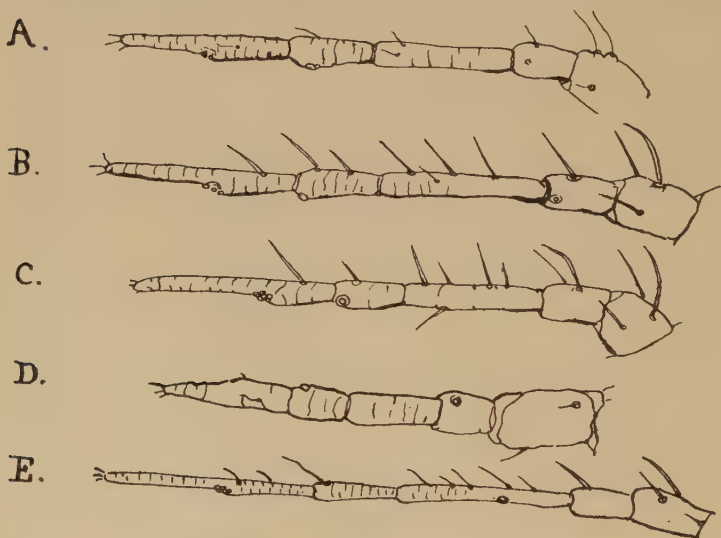


Fig. 12.

A. Antenna of Apterous ♀ *Atheroides serrulatus*; B. of *A. hirtellus*; C. of *A. junci*; D. of *A. brevicornis*; E. Alate ♀ of *A. hirtellus* (after Laing).

2 small median hairs, 4 long ones at base of antennæ and 3 to 5 long ones behind eyes; some small ones on crown. Rostrum reaches to second coxæ or just beyond. Cornicles as pores on anterior edge of segment v. Whole body with many long hairs and small ones, practically spines. Legs short, with fairly long fine hairs.

Length 2 to 2.8 mm.

Alate viviparous female. "Brown, bristly, but bristles not so long as in the apterous female. Antennæ pale yellow, slender, of 5 segments; segment i. with 3 spines, twice as long as broad; ii. with 2 spines a little shorter than i.; iii. about three and a half times length of ii., with about five spines arranged evenly along the anterior margin and 1 or 2 sensoria; imbricated distally; iv. with 1 strong distal spine and the normal sensorium, longer than ii.; v. with 1 spine and the usual sensorium, composed of 4 outer and 1 inner small sensoria, 2 short spines at the tip, spur considerably longer than base, the two combined longer than iii. Proportions of segments 18, 16, 56, 22 (26 + 34). Head convex in front, with 2 lateral spines. Rostrum dull yellow, dark at apex, reaching second pair of coxæ. Pronotum brown, bristly. Metanotal bosses with a row of short spines on the inner margin, otherwise bare. Abdomen (in cleared specimens) with five broken bands of chitin, arranged in four longitudinal rows, spiny on chitinous areas, apical segment chitinised, with strong tuberculated bristles on margin. Cornicles pore-like on fifth abdominal segment. Legs pale yellow with tips of tibiæ and tarsi darker.

Length 1.8 mm.

Front wing appears to have the cubitus once forked. Hind wing with two oblique veins." Redescribed by Mr. F. Laing from one alate ♀.

Oviparous female. Apterous. Very long and narrow; brownish-black, densely covered with brown hairs. Antennæ very short,

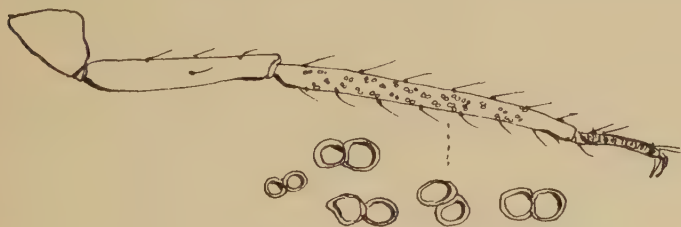


Fig. 13.—*Atheroides hirtellus* Haliday.
Hind leg and enlarged 8-shaped sensoria of oviparous ♀.

pale ochreous, apical segment dusky. Legs pale ochreous, with dark tarsi and black coxæ; venter greenish-grey to slaty-grey; a round black spot occurs on apex of abdomen ventrally. The body bristles arise from tubercles. Antennæ of 5 segments, nearly

reaching to posterior of pronotum ; segment i. wider but shorter than ii. ; iii. the longest ; iv. slightly shorter than ii. ; v. with basal area about same length as flagellum ; segment i. with 2 long hairs and 1 small one near apex ; ii. with 1 long one and 1 round sensorium near apex ; iii. with 3 long hairs and 1 small ; iv. with 1 long hair ; v. with 1 on basal area and 2 small apical spines (?3). Fore and mid femora with a few hairs ; fore and mid tibiæ with many ; hind tibiæ slightly wider than mid, with many sensoria, two together forming a figure of 8. Head and body spines much as in apterous female.

Length 1 to 1.7 mm.

Young oviparous female. Dull bluish to greenish grey. Head and pronotum black, the last interrupted by dorsal and subdorsal lines of ground colour ; head and pronotum also intersected by a pale dorsal line. Abdomen spotted with dark brown and from each dark spot a bristle arises. On each side of the pale dorsal line a series of large black spots, and immediately beneath them is a row of smaller spots. There is also a row below, along the sides of the large black spots. Venter slaty-grey or greenish-grey, with a dark spot at apex of abdomen. Antennæ and legs ochreous ; last segment of antennæ and the tarsi darker. Long stiff bristles arise from all the dark areas. Antennæ reach to anterior border of pronotum ; hairs and ratio of segments much as in adult.

FOOD PLANTS. *Juncus articulatus* (Haliday) ; grasses (Walker) ; *Aira caespitosa* (Jackson, Dallman and Laing).

LOCALITIES. Lancaster and near Belfast (Haliday and Walker) ; The Kyle, Invershin, N.B. (D. Jackson) ; Monymusk, Aberdeenshire, viii. 20 ; Trossachs, Perthshire ; Loch Awe, Argyllshire ; Oxshott ; Lynton and Newton Abbott, Devon ; Weymouth ; Guernsey (F. Laing) ; Arden Hall, Cheshire, 30 viii. 19 (Dallman).

Observations. This very strange bristly aphid has been re-described by Mr. Laing. I have added some colour notes and other stages sent me by Miss D. J. Jackson and have added some of my own. Miss Jackson found it in some numbers near the Kyle of Invershin. The insects occurred in the hollow channels of the leaves of *Aira caespitosa*, between the long

ridges and in long rows, with their heads pointing to the apices of the leaves. The areas where the aphides occurred were discoloured, being yellow spotted with brown. Miss Jackson also found the eggs laid by this insect. Laing says the apteræ occur between the ribs of the leaves, upon which they leave a brown linear stain after they have been feeding for sometime. The viviparous mother drops a larva and then moves forward a little way to give birth to another, so that after a time a long row of young is found nestling between the ribs of the leaf, the mother at the head and the oldest of the young at the tail. The young he found differed considerably from the dense black, glistening adults, in having the dorsum broken up with large squarish black areas bounded by green.

ATHEROIDES JUNCI Laing.

Laing, Ent. Mo. Mag., VI., 3rd Se. 44, fig. 5 (1900).

Apterous viviparous female. "Elongate, linear, spinose. *Antennæ* 5 segmented, slender, reaching just beyond the posterior margin of the prothorax; segment i. no longer than broad; ii. considerably longer than i.; iii. $2\frac{1}{3}$ times the length of ii., with 4-5 spines on the anterior rim and 1 on the posterior; iv. equal in length to ii.; v. considerably longer than iii., spur $\frac{1}{2}$ longer than base, primary sensorium compound, 3 short spines at tip. Proportions 11, 15, 35, 15 (20 + 25). *Head* convex in front, strongly spinose, $\frac{1}{10}$ of breadth, on the underside there appears to be 2 margino-frontal chitinous plates. *Rostrum* reaching to the third coxæ, stiletto-shaped. *Prothorax* spinose, uniformly chitinated; *mesothorax* broken up into 4 chitinous areas, 2 median and 2 lateral; *metathorax* similar though not so regular; length of the thoracic segments in proportion 4, 3, 2. *Abdomen*, all segments distinguishable; segments 1-5 and 7 with 2 lateral and 2 median chitinous plates, segment 6 with the 2 median ones united; strong spines on all the plates. Apical segment 3 times broader than long, with 5 conspicuous marginal spines. *Cornicles* on 5th segment. *Legs* moderately hairy, probably pale brown. *Length* 1.6 mm. Cotypes, two specimens in the B.M. On Rushes, England, Approaches *A. hirtellus*, but is a smaller insect; less spiny, non-tuberculate."*

* I am now of opinion that this so-called species is the pre-adult stage of *Atheroides hirtellus* Haliday (F. Laing).

ATHEROIDES BREVICORNIS Laing.

Ent. Mo. Mag. (Se. 3, VI.), 41 (1920).

Apterous viviparous female. "Elongated, linear, rugose, spinose. Spines except those on front of head and apical segment which are of the usual shape, spathulate-truncate, serrated at tip, rising from well-marked bases. *Antennæ*, 5-segmented, short, stumpy, reaching to about middle of prothorax, segment i. $\frac{1}{3}$ longer than broad, ii. just over half the length of i.; iii. a very little longer than i.; iv. a very little shorter than ii.; v. a little longer than iii., the spur about half the length of the basal part, with 3 short spines at tip. Primary sensorium on v. compound. Proportions of segments, 22, 14, 23, 12 (16+8). Head with 1 median and 2 lateral protuberances, the lateral with 2 strong spines, dilated spines numerous on rest of head, whole length is about two-thirds breadth. *Prothorax* not quite so long as head, *mesothorax* about three-fifths longer than the prothorax, *metathorax* about one-half the length of the mesothorax: numerous dilated spines on all 3 segments. Rostrum reaches mid coxæ, stiletto-pointed; first *abdominal segment* quite distinct, the next 6 segments distinguishable, apical segment distinct. Dilated spines numerous all over dorsum. *Cornicles* mere pores at anterior margin of fifth segment. *Apical segment* twice as broad as long, with the characteristic spines on the dorsum and about 10 ordinary spines medio-laterally on the margin. *Legs* apparently pale brown or yellow in life, tarsi dark, moderately hairy; coxæ stout, as long as broad.

Length 2.4 mm.

FOOD PLANT. On grasses, in England (Walker); *Poa maritima* (Laing).

Type, in British Museum. In life the insect is probably dark brown, pale yellow underneath; segment iii. of antennæ and legs except the tarsi pale brown. This species resembles *A. serrulatus* in shape, but is easily separated by the stumpy antennæ and the characteristic dilated spines." Laing (Entomo., LXI., 208, 1928) records it from Newburgh, Aberdeenshire on *Poa maritima* occasionally almost submerged by the tide. Found in plenty by Dr. J. D. Morison. Also at Aberlady, East Lothian and Fort William, Inverness-shire.

Genus PERIPHYLLUS Van der Hoeven.

Phillophorus Thornton.*Phyllophora* Fernie.*Chelymorpha* Clark.*Chaitophorinella* Van der Goot.*Arakawana* Matsumura ?

Van der Hoeven, Tijds. v. Ent., VI., 7 (1863) ; Thornton, Proc. Ent. Soc. Lond., n.s. II., 78 (1852) ; Fernie, Morris Nat., II., 265 (1852) ; Clark, The Microscope (1858) ; Van der Goot, Tijds. v. Ent., 56, 150 (1913) ; Van der Goot, Beit. z. Kennt. Holl. Blatt., 369 (1915) ; Matsumura, Journ. Coll. Agri. Tohoku Univ., VII., 6, 375 (1917) ; Baker, Proc. Biol., Washington, 31, 85-88 (1918) ; Baker, Bull. 826, U.S. Dep. Agri., 34 (1920).

This genus, which has been confused with *Chaitophorus*, has the following characters: Antennæ moderately long, hairy, alate female and males with oval sensoria. Cornicles thick, short, truncate, sculptured. Cauda and anal plate rounded. Body hairy, Venation normal. Dimorphic forms occur. They live on the foliage and shoots of trees and often occur in large numbers. The males are alate and apterous ; oviparous females apterous and lay several eggs. The summer dimorphic forms are characteristic of this genus, with either lamellate lateral processes or long hairs.* Linnæus' *Aphis aceris* has usually been taken as the type of *Chaitophorus*, following Passerini (1860), but as has been previously shown *populi* with its knobbed cauda is the type. Our common so-called *aceris* Linnæus falls in this genus. The type of *Periphyllus* was set by Van der Hoeven with his *testudo*, which is clearly the same as Thornton's *Phillophorus testudinatus*. The generic name *Phillophorus* of Thornton has to fall, as it was preoccupied in 1840. In 1858 Clark used the name *Chelymorpha* for a species he called *phyllophora*, but this was only Thornton's *testudinatus*, the generic name *Chelymorpha* had been used as far back as 1834. Van der Hoeven's species *testudo* is certainly *testudinatus*. Van der Goot used *testudinatus* as the type of his genus *Chaitophorinella*, consequently this name has to fall as a synonym. The type of the genus is Thornton's *testudinatus*, the *testudo* of Van der Hoeven.

* Baker (Proc. Biol. Soc., Washington, 31, 1918) deals with the dimorphs of this genus.

Four species are said to occur in this genus in Great Britain, namely :

1. *Periphyllus testudinatus* Thornton.
2. *Periphyllus lyropictus* Kessler.
3. *Periphyllus aceris* Koch (Linnæus part).
4. *Periphyllus horridus* Theobald.

They all feed on Sycamore and Maples. *P. lyropictus* appears to be rare and *P. horridus* has only been found three times.

The alate viviparæ and the apteræ of *aceris* and *testudinatus* are almost impossible to separate, but the dimorphs are very distinct. The relative lengths of segment iv. and v. vary too much to rely on, I find.

If the distinctive features given of *aceris* and *testudinatus* hold, then the species tabulate as follows :

A. Flagellum of vi. longer than base.

1. Flagellum very little, if any, shorter than segment iii. No summer form. *lyropictus*.

Flagellum much shorter than iii. Summer larvæ present. 2.

2. Antennal segment iv. nearly as long as v. Summer larvæ foliate. *testudinatus*.

Antennal segment iv. about $\frac{1}{4}$ longer than v.; flagellum shorter than former. Summer larvæ with long hairs, occurring in groups. *aceris*.

B. Flagellum of vi. shorter than base. *horridus*.

Signoret (Bull. Soc. Ent. Fr., VIII., xi. 1868) figures and gives a note on *Periphyllus laricis* Haliday, found on *Larix europæus*, at Holywood. From the figure it looks like *aceris* to me.

Balbani and Signoret, in 1867 recorded the fact that the Aphid on the maple (*Acer campestre*) could produce two kinds of young, one normal in form, the other quite diverse in form and incapable of reproducing its kind. These two forms are quite distinct, the normal larva having a marked hairy appearance and a form described under the following synonyms: *Phyllophorus testudinatus*, *Chelymorpha testudo*, *Periphyllus testudo*, and the Puceron L'Eraple, of these writers, the latter is the foliate larva. Balbani and Signoret describe a third form of larva which has hairs partly developed into folioles and of this they remark that it is only the scattered winged and wingless females which produce the foliate young, the associate females produce the hairy young.

I have rarely found the hairy young, but the dimorphic foliate forms are common.

With the former wing-buds develop and alatae come from them, but never from the foliate forms. Although I have only found the hairy larvæ twice, on both occasions some were assuming winged buds.*

Walker described the male *aceris*. He also describes the oviparous female as having "at an early period of its growth two deep green spots on the back and afterwards there are two brown spots along the back having a buff space between and sending forth on each side a short branch to the border of the abdomen, which is much broader than the chest; these stripes are sometimes very uneven, or broken, of various shades and tints, the colour of the whole body is also variable, being yellow or brown or green varied with black or almost black."

Buckton also refers to the oviparous female as follows: "Rather smaller than the apterous male. Occurs of various colours, such as yellow, green, brown or wholly black. The lighter specimens have two dark green spots and a series of black stripes down the back." I have a male and oviparous ♀ of a *Periphyllus*, but I am not certain whether they belong to *aceris* or *testudinatus*. From Van der Goot's description it seems to be the latter.

Buckton also describes an apterous male as "Long, oval, attenuated posteriorly. Colour buff-yellow, with rich brown patches on head and thorax. Abdomen with six or more interrupted dorsal bars and numerous spots and blotchings at the sides. Cornicles inconspicuous. Antennæ about the length of the body, brown at the articulations. Eyes red. Legs yellow, with a longitudinal forked band on the femora." Passerini also mentions an apterous male.

PERIPHYLLUS TESTUDINATUS Thornton.

Aphis aceris Linn. p.

Phyllophora testudinacea Fernis.

Chaitophorus aceris Koch p.

Periphyllus testudo Van der Hoeven.

* Mr. A. W. Rymer Roberts who has recently been working at this genus adds some notes in the Appendix.

Chaitophorus testudinatus Kessler.

Chaitophorinella testudinata V. d. Goot.

Thornton, Trans. Mic. Soc., Lond., III. (1852); Linnæus, Syst. Nat., I. (1767); Koch, Die Pflanz., 14, 16, figs. 19, 20 (1854); Van der Hoeven, Tijds. v. Ent., vi. 7 (1863); Kessler, Nova Acta der Kön. Acad. Leop. Carol, II., S. 151 (1886); Van der Goot, Tijds. v. Ent. deel., LVI. (1813); Beit. z. Kennt. Holl. Blattläuse, 374 (1915); Oestlund, Ent. News, Phil., XIX., 131 (1908); Davis, Ent. News, XXI., 14-16 (1910); Bunnett, Proc. S. London Ent. and N.H. Soc., 21 (1915-1916).

Alate viviparous female. Antennæ dark, i. and ii. black, iv. paler, not so long as body; i. larger than ii.; iii. longer than iv.; iv. about as long as v., not so long as v. + base of vi.; flagellum not so long as iii., rather more than one third less; iii. with 19-20 sensoria. Rostrum nearly to second coxæ. Green; head and thorax black; abdomen with dark bars and lateral spots. Legs

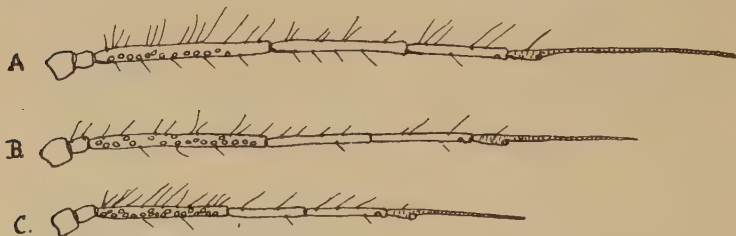


Fig. 14.

A. *Periphyllus lyropictus* Kessler; B. *P. testudinatus* Thornton; C. *P. aceris* Koch.

Alate ♀ antenna.

yellowish white to yellowish green, most of femora dark; apices of tibiæ and the tarsi dark. Antennæ yellowish on segment iii., remainder dark. Cornicles dark, in some olive green, apices reticulate. Body hairs long, not grouped. Rostrum nearly to second coxæ. Wings with tawny yellow costa, stigma and veins.

Length 2.9 to 3.2 mm.

Apterous viviparous female. Dark green to slaty grey-green, with black spots from which hairs arise in tufts. Eyes black. Antennæ yellowish-white, apices dark. Legs yellowish, apices of tibiæ and tarsi dark. Cauda greenish. Antennæ shorter

than body ; flagellum much shorter than iii. ; segments iv. and v. nearly equal. Cornicles deep olive green. Rostrum to about second coxæ.

Length 2.5 to 2.8 mm.*

Dimorph. Green with marked foliate lateral plates to body, also on head and basal antennal segment. Body with marked series of plates divided into two median, two sub-median and a lateral longitudinal series. Legs short and thick ; first and second tibiæ with broad hairs ; hind tibiæ with simple hairs.

Male. Alate. Head and thorax black. Abdomen green with black bars and spots. Antennæ and cornicles black. Cauda green. Antennal segment iii. with 41 ; iv. with 22 ; v. with 14+1 ; vi. with 1-2+6 sensoria.

Length 2.4 mm.

FOOD PLANTS. *Acer pseudo-platanus*, *A. negundo*, *A. platanoides* and *A. campestre* and *Ribes* (Walton).

LOCALITIES. General over Great Britain and Europe.

Observations. The alatæ and apterous viviparous females very difficult to separate from *aceris*. The dimorphs are very distinct, however ; they occur as isolated individuals under the

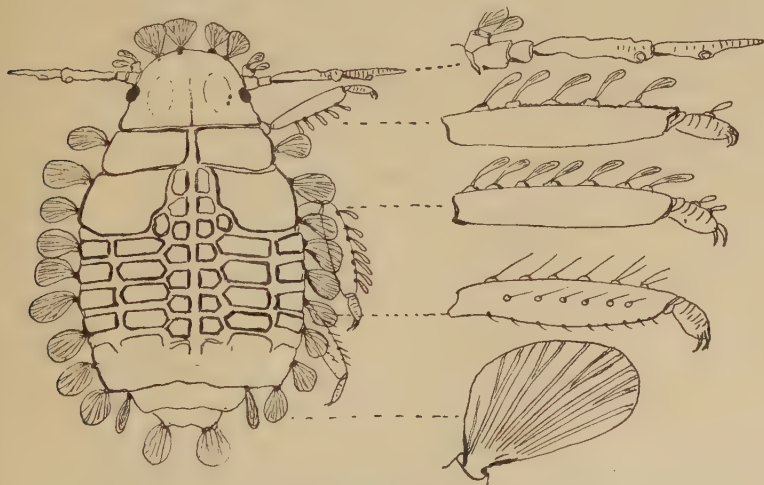


Fig. 15.—*Periphyllus testudinatus* Thornton.
Dimorphic larva, with further enlarged antenna, legs and foliate plate.

leaves. Dr. C. L. Walton sent me alatae and apterae from *Ribes rubrum*, taken in numbers at Llandudno Junction in May, 1921. The only male I have taken was at Wye in October, 1914. The relative lengths of antennal segments iv. and v. vary, usually they are nearly the same length; or iv. slightly shorter than v.; but very often they are equal, but the difference is never marked. The apterae are tuberculate, both fundatrix and second generation, whilst the second generation of *aceris* is uniformly green and never tuberculate, according to Kessler. I have never seen this form of *aceris*. Bunnett gives a fine figure of the dimorph. Van der Goot describes the oviparous ♀ as having 120-140 small sensoria on the hind tibiae.

PERIPHYLLUS ACERIS Koch.

Aphis aceris Linn. p.

Chaitophorus aceris Koch.

Chaitophorinella aceris V. d. Goot.

Linnaeus, Syst. Nat., I., 11, 736, 31 (1767); Koch, Die Pflanz., 14, 12, Pl. iii., figs. 19, 20 (1857); Van der Goot, Z. Tijds. v. Ent. deel LVI. (1913); Beitrage z. Kennt. d. Holland, Blattläuse, 370

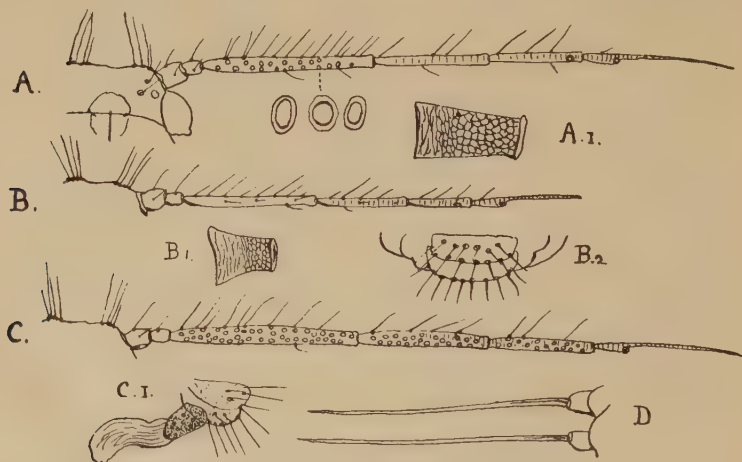


Fig. 16.—*Periphyllus aceris* Koch.

A. Head and antenna of alate ♀; A.1. Cornicle; B. of apterous ♀; B.1. Cornicle; B.2. Cauda and anal plate; C. Male.; C.1. Genitalia; D. Body hairs.

(1915); Kessler, Nova. Acta. d. Kön. Acad. Leop. Carol, Bd. ii. LI., n. 2, 159, Pl. xxxiv. (1886).

Alate viviparous female. Deep green, with black bars and lateral spots; head and thorax black; cornicles black; antennæ yellowish, apex black; legs yellowish, apices of femora, tibiæ and the tarsi black. Body, legs and antennæ with long hairs. Antennæ slightly shorter than the body; segment i. larger than ii.; iii. longest, with 12 to 19 sensoria; iv. longer than v.; vi. with

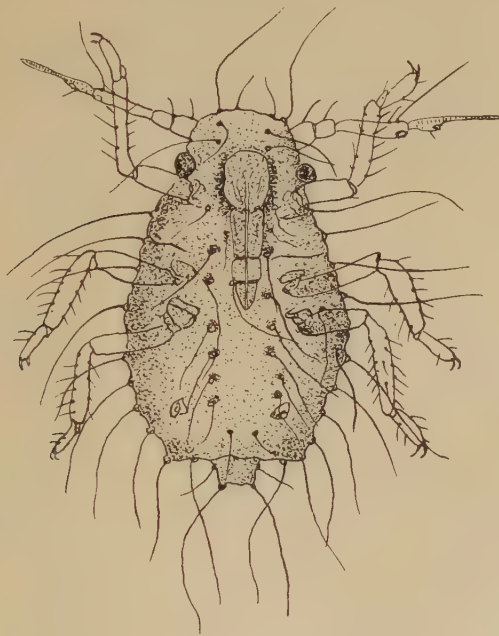


Fig. 17.

Dimorphic larva of *Periphyllus aceris* Koch.

flagellum much shorter than iii. and a little longer than iv., four times as long as base. Rostrum reaches to about second coxæ. Cornicles short, apex reticulate.

Length 3.4 to 3.8 mm.

Apterous viviparous female. Green, with long thin hairs, not arising in tufts, with two irregular darker lines running down abdomen. Legs and antennæ same colour as body; apices of

antennæ dark and the tarsi. Antennæ shorter than body ; segment i. larger than ii. ; iii. longest ; iv. a little longer than v., usually about one-quarter longer ; flagellum shorter than iii.

Length 2 to 2.6 mm.

Stem Mother (Fundatrix). Slaty-grey to deep greyish-green, with black tubercles, from which short dark hairs arise, two lines of large sub-median ones, a smaller line of the spots each side and dark lateral spots.

Dimorph. Yellowish-green with very long darkish hairs, no foliate structures. They occur in groups closely packed together.

Length 0.6 to 0.7 mm.

FOOD PLANTS. *Acer pseudo-platanus* and *A. campestre*.

LOCALITIES. Wye, 6 vi. 11 ; vii. 01 ; vi. 20 ; 9 ix. 15 ; v. 26 (F.V.T.) ; Reading, vi. 27 (F.V.T.) ; Berkhamsted, 10 x. 15 (Rymer Roberts) ; Porlock, 6 v. 11 and 28 v. 15 (Crawley) ; Windermere, 2 vi. 24 (Rymer Roberts) ; Wimbledon Common ; Bagshot (Laing).

Observations. I have only found this insect a few times. It lives much as the former species, but the dimorphic forms cluster closely together in patches under the leaves. The fundatrix is very like that of *testudinatus*, but the apteræ of the second generation are very different, being all more or less uniform pale green with long hairs, not arising from dark tubercles. The dimorphs also differ markedly, having long hairs instead of foliate ones as in *testudinatus* and the body is not marked out into plate-like areas as in the latter species.

PERIPHYLLUS LYROPICTUS Kessler.

Chaitophorus lyropictus Kessler.

Chaitophorinella lyropictus V. d. Goot.

Kessler, Nova. Acta. d. Kön. Leop. Carol. LI., 2, 171, Pl. xxxiv., figs. 11-14 (1886) ; Van der Goot, Tijds. v. Ent. deel. LVI., and Beitr. z. Kennt. Holland. Blattläuse, 371 (1915).

Alate viviparous female. Green ; head and thorax dark brown to black ; abdomen with dark transverse bars and lateral spots. Antennæ dark, as long as to a little longer than the body ; segment i. wider but no longer than ii. ; iii. longer than iv. ; iv. longer than v., about as long as v. + base of vi. ; flagellum nearly

to quite as long as iii.; iii. with 11-14 round sensoria. Rostrum reaching to second coxæ. Cornicles black, truncate, apex reticulate. Legs same colour as body; apices of femora and the tarsi dusky. Wings with brown costa, stigma and veins. Body with rather long hairs, those at the sides arising in more or less small groups.

Length 2.5 to 2.8 mm.

Apterous viviparous female (second generation). Bright yellow of various shades; head and thorax with some brown markings; abdomen with a dark brown mark, often lyre shaped. Eyes red. Antennæ yellowish-brown, apex black. Legs same colour as body or more yellowish; tarsi deep brown. Cornicles dark, apex reticulated. Cauda yellow. Antennæ about two-thirds of body; hairs moderately long; segment iii. longest; iv. longer than v., about as long as v. + base of vi.; flagellum long, but not quite so long as iii. Rostrum reaches to base of second coxæ. Legs with rather long hairs.

Length 3 to 3.2 mm.

Oviparous female. Apterous. Dirty yellowish to yellowish-brown; head and part of thorax darker; abdomen with a brown lyre-shaped mark on the dorsum. Eyes red. Antennæ yellow, apex black. Legs yellowish-brown; tarsi black. Cornicles dark. Cauda green. Oval, with moderately long hairs. Antennæ shorter than body, with rather long hairs; segment iii. and flagellum equal; iv. longer than v., about as long as v. + base of vi. Rostrum reaches second coxæ. Legs with rather long hairs; hind tibiæ rather thickened with from 55 to 65 round sensoria. Cauda "warzen formig."

Length 3 mm.

FOOD PLANTS. *Acer pseudo-platanus*, *Acer campestre*.

LOCALITIES. Cheshunt, Herts, 15 vii. 15; Wye, vii. or (F.V.T.).

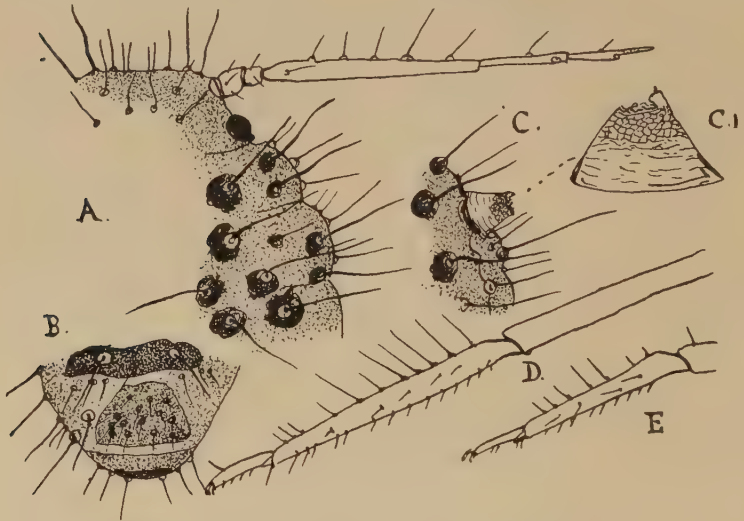
Observations. Evidently a rare species in this country. I have only found it twice and then only one or two specimens. There does not appear to be any summer dimorphic form. It can be told from the other British *Periphyllus* by the long flagellum.

Kessler figures and describes the stem mother, which is dark coloured with black tubercles.

PERIPHYLLUS HORRIDUS Theobald.

Entomologist, LX., 33, 1927.

Apterous viviparous female. Dark brown. Globular, very spinose; spines very long and irregular, arising from very marked tubercles; some finer hairs also. Head flat in front. Prothorax and mesothorax well defined. Antennæ short, reaching just past second coxæ; of six segments; i. wider than ii. and about same length; iii. long, longer than iv.; iii. rather irregular in outline, with some long hairs; iv. about equal to v.; vi. with base longer than the short flagellum; iii. to vi. finely spotted. Eyes moderate

Fig. 18.—*Periphyllus horridus* Theobald.

Apterous viviparous ♀. A. Head, antenna and thorax; B. Caudal end; C. and C1. Cornicles; D. Hind leg; E. Fore leg.

black and red. Rostrum reaches to second coxæ; apical segment acuminate, a little longer and broader than the penultimate segment. Cornicles pale brown, short, truncate, base expanding; a small blunt irregular process one side of apex; apex finely reticulate. Cauda rounded. Anal plate entire, rounded, hairy. Legs rather short and thick; apices of tibiæ and the tarsi darkened; tibiæ with many very long hairs one side and short ones the other and on the surface; first pair shorter than second,

and second than the third. The long body-hairs arise from very prominent, dark tubercles.

Length 3 mm. ; *breadth* 2 mm.

FOOD PLANT. Sycamore (*Acer pseudo-platanus*).

LOCALITY. Selworthy, 21 v. 15 (Crawley).

Observations. Described from two specimens collected by Mr. W. C. Crawley. It is a very marked Aphid, owing to the large number of long, stiff, spine-like hairs, which arise from prominent dark tubercles. The specimens mounted in balsam were so opaque that they had to be cleared in caustic potash and remounted to show the cauda and anal plate ; in so doing most of the long, thick hairs were destroyed in the type.

I originally described the antennæ as of 5 segments ; since they have been remounted a distinct division in the third segment has become visible, so that the antennæ are of 6 segments.

The very short flagellum at once demarks this from other species of *Periphyllus*.

Type in the writer's collection.

Genus LAINGIA Theobald.

Bull. Ent. Res., XII., pt. 4, 429, fig. 1 (1922).

This genus appears to be intermediate between *Atheroides* and *Sipha*. Body elongate in apterous female ; head rounded in front, moderately large. Eyes large ; ocular process prominent, truncate. Rostrum thick, rather short. Antennæ short, of 5 segments, scarcely reaching to end of pronotum ; pro-, meso- and meta-notum distinct, about equal in size, metanotum now and then a little smaller. Legs rather short and thick. Cornicles round, very slightly raised. Cauda rather small, broad, parallel at sides, rounded apically. Anal plate rounded, broader than cauda ; both hidden by the prominent semicircular apex of abdomen. Integument spinose ; a few short hairs on body, long thick ones on apex and head. Wing venation Aphidine ; alate antennæ of 5 segments ; sensoria round ; cauda almost spinose.

This genus, which comes between *Sipha* and *Atheroides* differs from the former in the non-knobbed cauda and from the latter in the non-rounded cauda. The genus was named after Mr. F. Laing, of the British Museum. It is so far represented by a single species.

LAINGIA PSAMMÆ Theobald.

Bull. Ent. Res., XII., pt. 4, 429, fig. 1 (1922).

Apterous viviparous female. Elongate, rather narrow. Colour varying from dull straw to dingy brownish-green. Eyes dark. Legs rather short, darker than body; apices of antennæ dusky. Apex of rostrum dusky. Dusky lateral patches on the abdomen and some other small dusky spots; apical segment dark, also apex of cauda. A dusky area around base of cornicles. Anal plate dusky. Antennæ about as long as pronotum, of 5 segments;

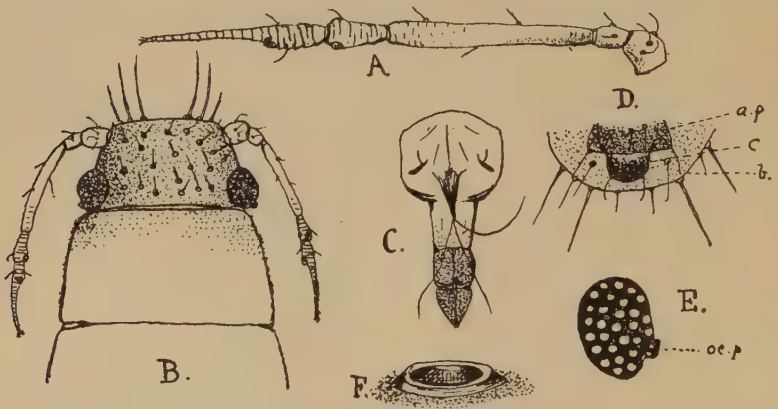


Fig. 19.—*Laingia psammæ* Theobald.

A. Antenna of apterous viviparous ♀; B. Head, antennæ and prothorax; C. Rostrum; D. Anal plate (a.p.); Cauda (c.); apical segment (b); E. Eye and ocular process (oc.p.); F. Cornicle.

i. wider and slightly longer than ii.; iii. as long as to a little longer than v.; iv. small, from one-quarter to one-fifth length of iii.; v. with basal area as long as or a little longer than iv.; 4 curved hairs on basal and 2 on second segment; 3 to 4 on iii.; 1 on iv. near apex, opposite the sensorium; 2 on apex of basal area of v.; 1 primary and 6 secondary sensoria at junction of basal area and flagellum; a group of 3 small pale apical spine-like hairs. The rounded head bears several long and short thick pale hairs, projecting forwards and spreading onto the vertex. Eyes with ocular processes, markedly quadrate and truncate. Rostrum rather short and thick, reaching to second coxæ; apical and penultimate segments about equal in length. Integument finely

spinulose ; a few short hairs on body, longest towards the apex ; apical segment rounded, with 4 long hairs and some smaller ones, covering the cauda. Cornicles round, on slightly elevated cones and situated on a small dark area. Cauda short and broad, rounded at apex, dark, with 2 long hairs. Anal plate broader than cauda, sides somewhat straight. The dark legs rather short and thick, a few hairs on femora, more on tibiæ.

Length 1.9 to 2.1 mm.

Alate viviparous female. Various dull shades of brown and dull brownish green ; head and mesothorax darkened ; abdomen with darker transverse bars and lateral spots. Pronotum paler and large. Antennæ not nearly so long as thorax, of 5 segments ; i. wider but scarcely longer than ii. ; iii. nearly as long as v. ; iv. small, about one-third or less than iii. ; v. with basal area a little longer than iv., flagellum twice as long as basal area. Head flat in front, with 6 long hairs in front and several smaller ones on vertex ; the stemmata pale, rather large, round. Eyes large,

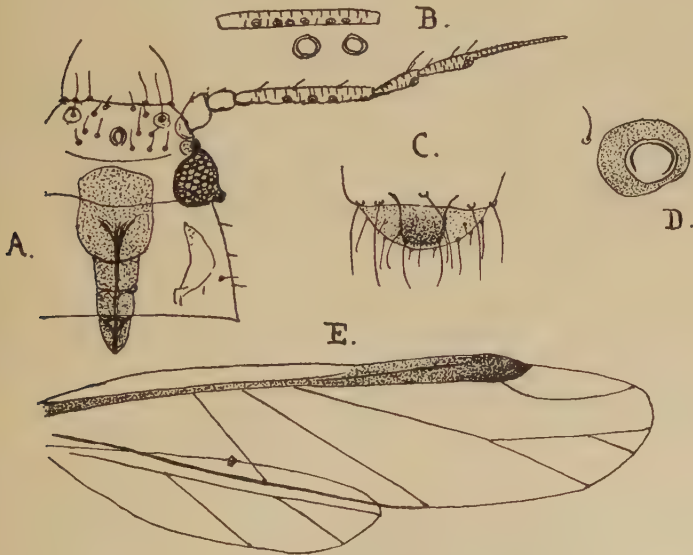


Fig. 20.—*Laingia psammæ* Theobald.

Alate viviparous female. A. Head, pronotum and rostrum ; B. Antenna ; C. Cauda and anal plate ; D. Cornicle ; E. Wings.

with marked truncate ocular process. Rostrum thick, not reaching second coxæ. First pair of legs far apart from the second; third close to second, rather thick. Cornicles rounded, level or nearly so with body. Cauda square, with 2 long apical hairs. Anal plate rounded, with 6 apical hairs, 2 small. Several long hairs at apex of body, all arising from marked papillæ. Wings long and narrow, much longer than body; veins thick. Venation normal, but one fork may be absent, even in the same specimen.

Length 1.3 to 2 mm.

LOCALITIES. Littlestone, vii. and viii. 21-24; Seasalter, near Whitstable, 14 vii. 22; Sandwich, 19 viii. 22; Camber, Sussex; Ainsdale, Lancs. (B.M. Coll.).

FOOD PLANTS. Marram Grass (*Psamma arenaria*); Timothy Grass (*Dactylis glomerata*); Wheat.

Observations. This aphid was first found by Captain A. Duffield, M.C., on the sandhills near Littlestone, and later by myself and also on Timothy Grass near by. It lives in the seed heads, deeply buried in the flowers and is somewhat difficult to detect, owing to its colour. The insects produce much honey dew and by means of their constant sucking in conjunction with the honey dew, destroy the seed heads. In 1922 I found it swarming at Seasalter in July and found a number of alate females and at the same time several colonies on wheat near the banks of the Swale. It likewise swarmed on the Marram Grass at Sandwich Haven. It seems to have many natural enemies, especially the Lady Bird Beetles, *Adalia bipunctata* and *Coccinella 7-punctata*, also Syrphid larvæ and Braconidæ.

Sub-tribe PTEROCOMMINA.

This sub-tribe comes either between the *Callipterini* and *Chaitophorini*, or between the latter and the *Lachnini*. Oestlund and more recently Wilson in America take the latter view.

The wing venation is the same as in the *Aphidinae*. The cornicles are fairly short or very short and may be markedly vasiform or almost cylindrical. Antennæ of 6 segments and shorter than the body in British species, but in some may reach to near the base of the abdomen. The cauda is short and broadly rounded as in the *Lachnini*. The entire body, legs and antennæ are hairy. The antennal sensoria are round.

Most of the species of this sub-tribe occur on *Salix* or *Populus*, one occurs on Maple in America (*Pterocomma smithii*, Monell), and one in England on Ash (*Fraxinus excelsior*), the *Pterocomma fraxini* Theobald.

Two genera occur, namely :—

1. *Melanoxantherium* Schouteden.
2. *Pterocomma* Buckton.

Wilson does not consider the two genera separate, and as Buckton's name has precedence he monographs all the *Pterocommini* under the genus *Pterocomma*. It seems to me that *Melanoxantherium* and *Pterocomma* are distinct from one another, as shown by British species and hence I retain the two genera.

In *Melanoxantherium* the cornicles are very prominent and vasiform, in *Pterocomma* they are small and more or less irregular in form. *Pterocomma fraxini* is to some extent intermediate between the two genera. This sub-tribe has been worked out in America by Wilson (Annals of the Ent. Soc. of America, VIII., 347-358, 1915) and by Baker, who also tabulates and figures the American species (Journ. Eco. Ent., X., 431-433, 1917, and Canad. Ent., 48, 280-289, 1916), and by the latter in his Generic Classification of the Hemipterous Family Aphididæ (Bull. 826, 35-36, 1920), where he separates the two genera. I have received immature specimens of *Pterocomma* from the North Arctic regions.

Genus PTEROCOMMA Buckton.

Cladobius Koch.

Aphioides Passerini.

Aristaphis Kirkaldy.

Buckton, Mono. Brit. Aphid., II., 142 (1879); Koch, Die Pflanz., 251 (1857); Passerini, Gli. Afidi., 28 (1860); Kirkaldy, Canad. Ent., XXXVII., 416 (1905); Wilson, Ann. Soc. Ent. America, VIII., 347 (1915); Van der Goot, Holland Blattläuse, 273 (1915); Baker, Bull. 826, U.S. Dept. Agri., 36., Plate IV., pp. (1920).

Cornicles rather short, varying in shape from almost cylindrical to narrowly and irregularly clavate. Antennæ of 6 segments, hairs long and thin. Alatæ with round antennal sensoria and sometimes the apteræ. Wings normal. Cauda more or less rounded, in some narrower and slightly prominent with long hairs. Anal

plate rounded, with long hairs. Antennæ rather short in apteræ, but in alatæ reaching to the end of the body. The cornicles vary in form, even in members of the same colony. Whole insect hairy. Males and oviparæ apterous. In 1879 Buckton created this genus with his *pilosa* as the type (*pilosa* is clearly the *populea* of Kaltenbach). In 1857 Koch founded the genus *Cladobius* for *populea*, that name, however, was preoccupied in the *Coleoptera* in 1837. Passerini then suggested *Aphiodes*, but this was previously used for Hemiptera by Rondani in 1847. Kirkaldy used the name *Aristaphis* for *Cladobius*, but it was also preoccupied, so that Buckton's name takes precedence. Van der Goot places this genus in the *Aphidina* (Holl. Blattläuse, 273).

Five species occur in Great Britain :

1. *Pterocomma populea* Kaltenbach.
2. *Pterocomma bituberculata* Theobald.
3. *Pterocomma fraxini* Theobald.
4. *Pterocomma jacksoni* Theobald.
5. *Pterocomma bicolor* Oestlund.

PTEROCOMMA POPULEA Kaltenbach (non Buckton).

Aphis populea Kaltenbach.

Cladobius populeus Koch ; Van der Goot.

Aphiodes populeus Passerini.

Pterocomma pilosa Buckton.*

Kaltenbach, Mono. Pflanz., 116, 90 (1843) ; Walker, Ann. Mag. Nat. Hist., Se. 2, I., 457, 23 (1850) ; Koch, Die Pflanz., 252, Pl. xlv., figs. 327, 328 (1857) ; Passerini, Gli Afidi, 28 (1860) ; Buckton, Mono. Brit. Aphid., II., 143, pl. lxxxiii. (1879) ; Mordwilko, Ann. Rept. Imp. Acad. Sci., Petrograd (1908) ; Zool. Mus. Acad. Imp. Sci., Petrograd (1914) ; Del Guercio, Nuove Relaz. R. Staz. Ent. Agraria, Florence, Se. I., No. 2, 120 (1900) ; Pergande, Proc. Acad. Sci. Wash., II., 516 (1900) ; Henrich, Die Blattläuse Aphididæ, Emg. v. Hermstdt, 55 (1910) ; Wilson, Canad. Ent., XLII., 384 (1910) ; Wilson, Ann. Ent. Soc. Am., VIII., 353 (1915) ; Van der Goot, Holl. Blattläuse, 274 (1915).

Alate viviparous female. Greyish-brown to brown, venter greyish-green. Head dark brown to black. Antennæ reach just

* Laing considers this to be distinct, the hairs being longer.

past base of abdomen ; dusky, base very pale or yellow ; iii. longer than iv., with many small round sensoria ; iv. about equal to v. with 2 or more sensoria ; vi. slightly longer than v. ; the flagellum as long as base ; all segments hairy. Rostrum reaches to or beyond third coxæ. Eyes red, prominent. Thorax pale ferruginous to deep brown, lobes darkened ; a blunt spine on each side of pronotum. Abdomen ashy-grey to brownish-grey ; venter greenish-grey, with dark transverse bars and lateral spots,

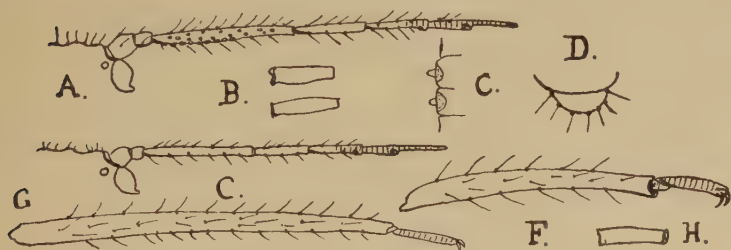


Fig. 21.—*Pterocomma populea (pilosa)* Kaltenbach.

A. Head and antenna of alate ♀ ; B. Cornicles ; C. Lateral papillæ ; D. Cauda ; G. Head and antenna of apterous ♀ ; C. Hind and F. fore tibia and tarsus ; F. Cornicle of apterous ♀.

in some specimens the bars are broken in the middle and there appears a pale median line ; a short stout tubercle in the centre of each dark lateral spot ; hairy, hairs brown to almost black. Legs pale brown, very hairy. Cornicles pale brown, apices dusky, about 3 times as long as wide, cylindrical, but a little swollen towards apices, which are dusky ; constricted at apices, which are widely flanged. Veins pale brown. Cauda small, not projecting beyond anal plate, yellowish-brown to brown, apex darkened. Whole body covered with a whitish waxy substance giving it a greyish-brown hue.

Length 3 to 3.8 mm.

Apterous viviparous female. Reddish to greyish-brown, covered with fine white mealy powder ; venter paler ; very hairy ; somewhat oval in shape ; a narrow pale median abdominal line and a series of narrow transverse pale lines separating the segments ; a dark lateral spot on each side of the segments, each with a central tubercle. Antennæ short, segments i. and ii. dark ; iii. paler, tinged with yellowish-brown ; iv. to vi. gradually darkening :

vi. being almost black; hairy; no sensoria on iii. Rostrum reaching to third coxæ. Legs with dark brown tibiæ and black tarsi; coxæ and base of femora pale yellow, remainder brown; all hairy. Cornicles small, varying in shape, mostly slightly and irregularly swollen, a few almost cylindrical; pale. Cauda short and broadly angular. Sometimes almost green specimens occur.

Length 3 to 3.5 mm.

FOOD PLANTS. Willows (*Salix*); Poplars (*Populus*).

LOCALITIES. Kentish Town (Buckton); Wye; Canterbury; Hastings; Battle; Lyndhurst; Cambridge; Newport, Essex; Newark; Chester; Stockbridge, Sheffield, 1 ix. 22 (F.V.T.); Camberley, 1 vi. 14 (Green); Chelsea; South Kensington; Kew; Aberdeen (Laing); Southgate (Walker); Great Salkeld (Britten); Inveran, Invershin, N.B., 8 ix. 20 (D. Jackson). Also America (Wilson); Germany (Koch, etc.); Italy (Passerini).

Observations. I have found this insect in great numbers on willows and poplars, but have never found the sexuales. Wilson says the males closely resemble the alate females, but are smaller and the oviparæ resemble the apteræ, but are larger. Alatæ occur in May and go on to the autumn.

PTEROCOMMA BITUBERCULATA Theobald.

Rept. Eco. Zool. for 1912, 82-84, Pls. XI. and XII., A. (1912).

Alate viviparous female. Head and thorax dark brown. Abdomen paler brown. Thorax with darkened lobes. Eyes black, much projecting. Head with rather long fine hairs in front. Antennal segment iii. and base of iv. pale brown, remainder dark brown; iii. slightly the longest, with a line of 8 to 10 sensoria and 2 separated ones near apex; v. slightly longer than iv.; vi. not quite so long as v.; iii. with several long, fine hairs on one side, a few on the sensoria side; iv. with a few and 2 to 3 on v. Pronotum with small prominent rounded tubercle on each side. Cauda short and dark. Cornicles short, pallid, somewhat swollen and irregular in form. Legs brown; apices of tibiae and tarsi dark; femora and tibiæ with many fine rather long hairs. Wings large, longer than body, stigma and veins brown.

Length 3 mm.

Oviparous female. Apterous; brown; oval to elongate. Pronotum tuberculate as in alate female. Eyes prominent but more rounded. Antennæ shorter than in alata; segment iii. with 9 to 10 sensoria; v. a little longer than iv.; vi. about as long as v. Legs, cornicles, etc., as in alate female.

Length 2.9 to 3.5 mm.

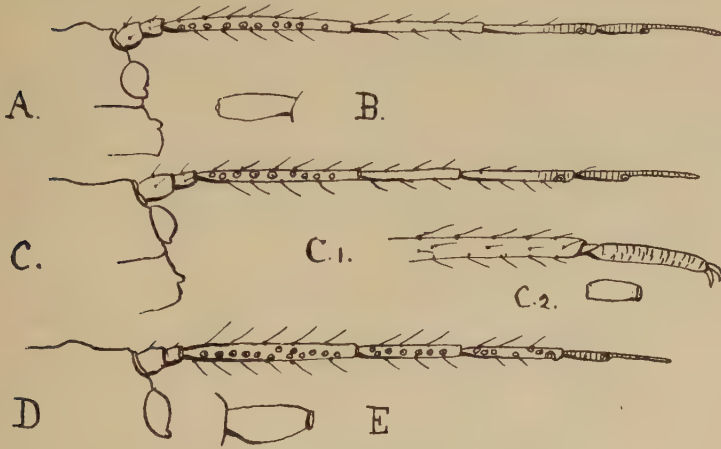


Fig. 22.—*Pterocomma bituberculata* Theobald.

A. and B. Antenna and cornicle of alate viviparous ♀; C. of oviparous ♀; C.1. Tarsus; C.2. Cornicle; D. Antenna and E. Cornicle of male.

Male. Smaller. Brown. Apterous. Antennæ about two-thirds length of body; segments iii. to v. with sensoria, most on iii. (12-15); 8 on iv.; 7 on v. Legs, etc., as in female.

Length 1.5 to 2 mm.

FOOD PLANTS. *Salix* spp.

LOCALITIES. Great Salkeld, Penrith, 17 x. 12; Selkirk, N.B., 2 ix. 14; Reigate, ix and x. 23.

Observations. I originally described this very marked aphid from specimens sent me alive by Mr. Britten, from Cumberland. He took them in numbers with *Pterochlorus saligna*. Since then I have received the same insect from Selkirk and from Surrey, where it was doing much harm to osier plantations. It differs from *populea* in being larger and less hairy, and in the antennal structure. The abdomen is also not banded as in *populea*. I

cannot detect any sensoria in the long, thin, hind tibiæ of the oviparous female.

PTEROCOMMA JACKSONI. Theobald.

Entomologist, LIV., 232 (1921).

Apterous viviparous female. Variegated in colour; ground colour pinkish-brown, but median area of abdomen pale greenish, merging into pink in region of the cornicles; a pale dorsal line begins on the mesothorax and is continued to the cauda. On sides of thoracic segments are very dark green blotches and these are continued on the 3 median abdominal segments, interrupted on the segment in line with cornicles and then continued as a darker green patch to end of body. Some specimens are unicolorous pinkish brown. Legs ochreous, with apices of femora and tibiæ

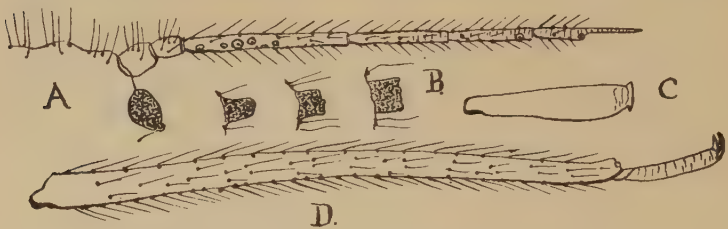


Fig. 23.—*Pterocomma jacksoni* Theobald.

A. Head and antenna of apterous ♀; B. pronotal tubercles; C. Cornicle; D. Hind tibia and tarsus.

and all the tarsi brown; in hind legs all the tibiæ are brown. Rostrum long, ochreous, apex brown. Antennæ ochreous, basal segments brownish. Cornicles ochreous, in some bright orange. Venter uniformly yellowish or pinkish-yellow, a brown spot at apex of abdomen. Eyes black. Body, especially venter dusted with tomentum. Leg hairs rather close and sloping towards apices not more or less erect as in *populea*. Antennæ about one-half of body, with longish hairs; segment i. longer than ii.; iii. longest with 6 to 9 round sensoria on basal three-quarters; iv. about equal to v.; vi. a little longer than v., its basal area not quite so long as flagellum. Rostrum reaching to 3rd coxæ. A marked papilla each side of pronotum, normally truncate. Body hairy. Legs very hairy; fore pair rather short and thick; mid longer;

hind with very long and densely hairy tibiæ. Cauda and anal plate very hairy, latter rounded; former longer, narrower but rounded. Cornicles about as long as segment v. of antennæ, narrowed at base, slightly swollen near apex, where it is constricted; apices flanged; nearly twice as long as hind tarsi. Immature forms show abdominal lateral papillæ and have no antennal sensoria and shorter legs.

Length 3 mm.

FOOD PLANT. Goat Willow (*Salix caprea*).

LOCALITY. Inveran, Invershin, 8 ix. 20 (D. Jackson).

Observations. Described from mounted specimens, and live colour notes sent me by Miss D. Jackson, who found this insect thickly clustering along the branches of a Goat Willow and closely attended by *Formica rufa*, that had many nests in the locality. The aphides harmonised exactly with the colour of the branches. It resembles *P. populea*, but the antennæ of the apteræ bear marked sensoria and the hairs on the legs are much closer and slope towards apices of the legs, in *populea* they are further apart and more erect.

PTEROCOMMA FRAXINI Theobald.

Entomologist, LIV., 233 (1921).

Apterous viviparous female. Dull reddish-brown, with dark median and lateral patches, from which very small tubercles arise and also on the pronotum. Antennæ reaching back just past third coxæ; segments i. and ii. dark; iii. and iv. pale, apices dusky; v. and vi. dark; i. larger than ii.; iii. not twice as long as iv., which is about equal to v.; vi. with flagellum twice as long as basal area, unlike *P. populea*; hairs long, fairly numerous, but not as much so as in *P. populea*, pallid on iii., darker elsewhere.

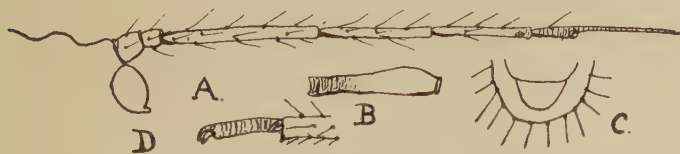


Fig. 24.—*Pterocomma fraxini* Theobald.

A. Antenna of apterous ♀; B. Cornicle; C. Cauda, etc.; D. Hind tarsus.

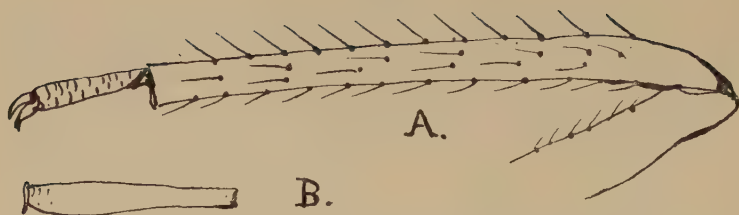


Fig. 25.—*Pterocomma fraxini* Theobald.
A. Fore tibia and tarsus; B. Cornicle.

Cornicles projecting and about as long as antennal segment v., nearly half as long as hind tarsals, swollen apically on one side; dull yellowish, apex dusky. Legs pale to deep yellowish-brown; fore and mid femora and tibiae thick; apices of tibiae dark; tarsi rather narrow. Cauda dark, rounded. Anal plate paler. Antennae, body and legs very hairy.

Length 3.9 mm.

FOOD PLANT. Ash (*Fraxinus excelsior*).

LOCALITY. Wye, 3 vi. II.

Observations. Described from a single large colony found on the petiole of an ash leaf. It is more robust than *P. populea*, from which it also differs in (i.) the larger cornicles, and (ii.) the longer flagellum of the sixth antennal segment. It most nearly approaches the American *P. bicolor* of Oestlund, but the cauda is not broadly angulated. *P. bicolor* has recently been found by Mr. Laing.

Genus MELANOXANTHERIUM Schouteden.

Melanoxanthus Buckton.

Buckton, Mono. Brit. Aphid., II., 21 (1879); Schouteden, Ann. Ent. Soc. Belg., 45, 113 (1901); Baker, Bull. 826, U.S. Dept. Agri. 36 (1920).

Hairy. Cornicles large, but variable in size, markedly vasiform and swollen. Antennae hairy, of 6 segments; sensoria circular. Cauda and anal plate rounded. Wings normal. Males alate. Oviparous females apterous. Large aphides; the females laying many eggs. Colonial on the bark of trees.

Buckton made this genus for Linnaeus' *Aphis salicis*, his name *Melanoxanthus* being preoccupied Schouteden renamed it. The genus also occurs in America and Japan.

MELANOXANTHERIUM SALICIS Linnæus.

Aphis salicis Linnæus.

Cinara salicis Mosley.

Salicifex Amyot.

Melanoxanthus salicis Buckton.

Pterocomma salicis Wilson.

Melanoxantherium salicis Schouteden.

Linnæus, Syst. Nat., 2, 736, 26 (1767) ; Fn. Suec., 995 (1789) ; Reaumur, Ins. 3, pl. 22, fig. 2 ; Fabricius, Ent. Syst. 4, 219, 47 (1794) ; Schrank, Fn. Boica, 2, 102, 1176 (1801) ; Fabricius, Syst. Rhyng, 301, 47 (1803) ; Kaltenbach, Mono. Pflanz., 131, 100 (1843) ; Ratzburg, Forst. Ins. III., 218, 18 (1844) ; Walker, Ann. Nat. Hist. Se. 2, I., 452, 24 (1848) ; Amyot, Ann. Soc. Ent. Fr., 2 me., Se. X., 16 ; Haliday, Ent. Mag., II., 102 ; Walker, List. Homop. (B.M.), IV., 951, 25 (1852) ; Mosley, Gard. Chron., I., 827 (1860) ; Buckton, Mono. Brit. Aphid., II., 21, pl. XLII., figs. 4 to 6 (1879) ; Schouteden, Mem. d. l. Soc. Ent., Belg., XII. 214, (1906) ; Wilson, Ann. Ent. Soc., Am., VIII., 349 ; Theobald, Rept. Eco. Zool. for 1912, 92, fig. 28, pl. XIII. (1913).

Alate viviparous female. Large deep greyish-black ; abdomen with 2 or more dorsal and several lateral grey to almost white patches. Cornicles large, vasiform and show up distinctly owing to being a bright orange. Antennæ rich black ; segments iii. and

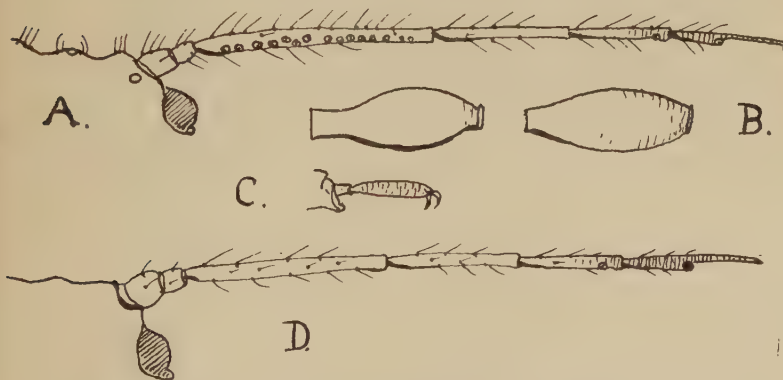


Fig. 26.—*Melanoxantherium salicis* Linnæus.

A. Head and antenna of alate viviparous ♀ ; B. and C. Cornicles and tarsus ; D. Head and antenna of apterous viviparous ♀.

iv. orange. Legs orange, dark femoral and tibial tips and dark tarsi. Eyes dark brown. Antennæ reach to about third coxæ ; hairy ; segment i. larger than ii. ; iii. longer than iv., with 14 to 35 sensoria on one side, spreading to near apex of segment ; iv. a little longer than v. ; flagellum of vi. about equal to basal area. Frontal hairs in three tufts. Rostrum orange, apex black, reaching beyond third coxæ. Cornicles very marked, showing no sculpturing. Legs and body hairy. Cauda dark and hairy. Small lateral tubercles on sides of abdomen. Wings with prominent dark veins and grey stigma.

Length 3.7 to 4 mm.

Apterous viviparous female. Dull greyish-black to sooty black, with a paler greyish or greyish-blue dorsal median line, in



Fig. 27.

Apterous Female of *Melanoxantharium salicis* Linnæus.
(Magnified sixteen times.)

some almost white. On each segment a greyish white spot, very variable in size and form, that on abdominal segment i. usually being the largest and other large ones at base of cornicles. Antennæ orange to almost red, in some darkened at apices. Cornicles bright orange red, very vasiform and flared at the apices. Legs orange, apices of tibiæ dark ; tarsi black ; in some

also apices of femora. Venter dusky greyish-green ; body very hairy. Antennæ reach to or just beyond base of thorax ; hairy ; segment i. larger than ii. ; iii. longest ; iv. a little longer than v. ; vi. with flagellum scarcely so long as basal area ; sensoria normal. Rostrum orange at base, apex dusky, reaching third coxæ. Pronotum with a small papilla each side. Lateral abdominal papillæ small. Hairs on front in 3 groups, as in alate female.

Length 3.5 to 4.2 mm.

FOOD PLANTS. *Salix viminalis*, *S. caprea* and many varieties of osiers and also on *Populus spp.*

LOCALITIES. Shere, near Guildford (Buckton) ; Kingston-on-Thames ; Putney ; Wye ; Romney Marsh, 10 ix. 13 ; Sittingbourne ; Blean Woods ; Canterbury ; Selby, 15 v. 12 ; Manchester, 17 vii. 17 ; Derby ; Panton, Lincs. ; St. Neots, Hunts., vii. 03 ; Bedford, viii. 05 ; Bath, vi. 09 ; Exeter, viii. 12 ; Fowey, Cornwall (F.V.T.) ; Kentish Town (Buckton) ; Brondesbury, N.W., London (F.V.T.) ; Lewes, New Forest, Lynton, Birmingham (Laing) ; Belgium (Schouteden) ; America.

Observations. A very marked insect, easily distinguished by the bright orange-red cornicles, legs and antennæ. It now and then occurs in dense masses, both on the shoots of osiers and on large willows. The individual colonies of apteræ often number many thousands ; on one occasion I found a solid mass of these Plant Lice two feet long in an osier bed at Wye, and many colonies were a foot long. Recently it has died out in that neighbourhood, none having been seen since 1911. In some of the Derbyshire and West country osier beds, it is a serious pest, for these insects kill the rods and even when only a few are present they stunt the rods and the attacked wood is stained. It seems to be erratic in its appearance on osiers and willows and as it also occurs high up on poplars one may imagine that there is some form of migration between *Salix* and *Populus*. Buckton notes as follows : " An interesting fact is observable every year in the garden of a friend at Kentish Town. A species of aphid infesting the willow and poplar is the prey of a species of aphidius (*Aphidius gregarius* of Marshall), to an extraordinary degree, the stung individuals collecting in masses round the leaves of the twigs.

The other day I saw a mass on one willow twig that must have consisted of many thousands, each of which I believe to have been stung ; later on they will become merely inflated skins, with the characteristic hole whence the parasite emerged."

It seems to me doubtful if the apterous ♀ described by Walker (Ann. Nat. Hist., Se. 2, I., 452, 1848) is this species.

Sub-tribe SALTUSAPHIDINA.

Body narrow and elongate to slightly oval. No ocular tubercles to eyes. Antennæ of 6 segments. Legs usually modified for leaping. Oviparous females apterous. Aphides which live freely on the foliage of sedges, rushes and grasses.

Two genera occur—*Saltusaphis* (Theobald) and *Thripsaphis* (Gillette). Both genera are represented in Great Britain.

Key to genera :

1. Head much elongated ; legs modified for leaping ; cornicles small, cup-shaped. *Saltusaphis.*
2. Head not much elongated, legs not modified for leaping ; cornicles as mere pores. *Thripsaphis.*

Genus SALTUSAPHIS Theobald.

Theobald, Bull. Ent. Res., VI., pt. 2, 138 (1915) ; Baker, U.S. Dept. Agri. Bull. 826, 31, Pl. IV., v.w. (1920).

Head very large ; a long space between frons and eyes, latter large and prominent. Thorax large, segments well defined ; prothorax very large in alate females and large in apterous. Body rather narrow, scarcely wider than head and thorax in alate females, slightly more swollen in the apterous. Antennæ of 6 segments in both forms ; longer than body in alate female, as long as or a little longer in apterous forms. Legs short ; fore and mid femora expanded. Cornicles small and cup-shaped, marked with lines of spots. Anal plate bilobed, each half bituberculate. Cauda knobbed, sometimes bilobed. Body hairs either fan-shaped or sickle shaped, except at apex. Rostrum short, not reaching second coxæ, which are widely separate from the first pair. Venation marked, fore wings with media twice branched ; hind wings with cubitus absent. Sexual forms apterous. No ocular process in any stage. Legs modified for leaping.

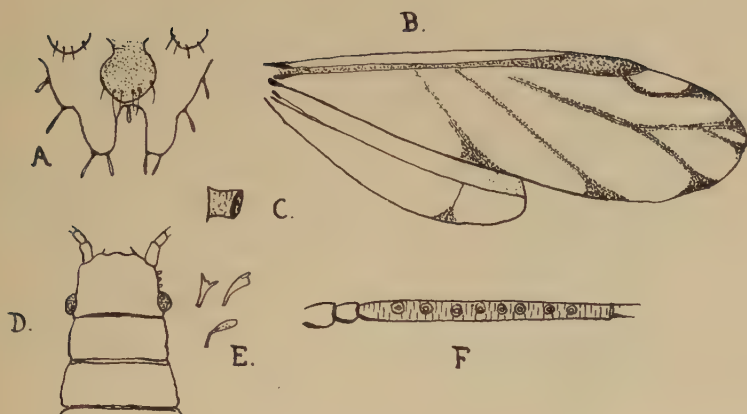


Fig. 28.—Characters of *Saltusaphis* Theobald.

A. Cauda and anal plate; B. Wings; C. Cornicle; D. Head and thoracic segments i. and ii; E. Scales; F. Third antennal segment.

Three species occur in Great Britain :

1. *Saltusaphis insessa* Walker.
2. *Saltusaphis familiaris* Walker.
3. *Saltusaphis ornatus* Theobald.

SALTUSAPHIS INSESSA Walker.

Aphis insessa Walker.

Walker, Zoologist, VII., App. 32 (1849) ; Laing, Ent. Mo. Mag. LVII., 123, fig. 3 A and 2 E. F. (1921).

Apterous viviparous female. "Oval, a little over half as long as broad, covered with short fan-shaped hairs, placed on prominent bases. Antennæ slender, about five-eighths the length of the insect, 6-jointed, markedly free from spines, with hair-rings closely set, the usual sensorium at distal end of v., the spur of vi. separated from its base by a rather long obliquity and with faintly marked primary sensorium, tip of spur with 3 short spines ; proportions of segments, 21, 15, 72, 40, 42 (35 + 26) ; total length 1 mm. Head marginally chitinised, nearly twice as broad as long, with 2 latero-median spines on forehead, and with numerous fan-shaped hairs. Rostrum reaching to mid coxæ. Eyes without ocular process.

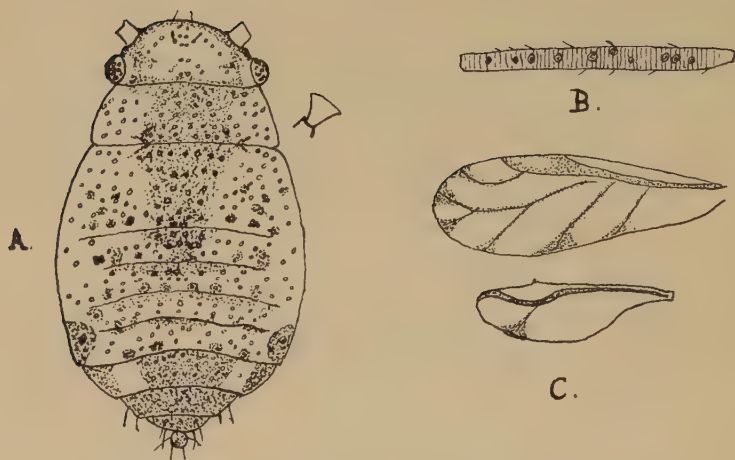


Fig. 29.—*Saltusaphis insessa* Walker.

A. Apterous viviparous ♀; B. Third antennal segment of alate ♀; C. Wings (after Laing).

Prothorax well-marked, a little less than two-thirds the length of the head, irregularly chitinised towards the centre. Meso- and meta-thorax fused, about equal to the head + prothorax, slightly chitinised towards the centre. Abdomen with segments well marked, most strongly chitinised along the segmental margins and occasionally around the bases of the tubercles; around the cornicles and on segments 5 and 6, strong chitin. Cauda knobbed, with a few long spines; anal plate widely bilobed. Legs, femora of front and second pairs thickened, with numerous long spines, and spinulose; lengths of hind legs:—trochanters .06 mm.; femur .3 mm.; tibia .44 mm.; tarsi .176 mm.

Total Length 1.7 mm. *Breadth* 1 mm.

Pupa. The potashed specimen resembles the apterous female, except that the body is chitinised only around the bases of the fan-shaped hairs and in the head being practically all dark.

Alate viviparous female. Antennæ slender, about two-thirds the length of the body, segment iii. with 10 secondary sensoria, double-rimmed, of varying size, scattered along the middle four-fifths, primary sensorium of v. some distance from tip of segment, the spur of vi. is broken off; proportions of segments, 21, 17, 108, 55, 50 (35 + ?). Head dark, except for a clear median, longitudinal streak; about twice as broad as long, with (roughly)

6 longitudinal rows of fan-shaped hairs. Prothorax not quite so long as the head, almost wholly brown, with numerous fan-shaped hairs which are absent in the metathoracic bosses. Wings, all the veins bordered with brown, the brown area extended at the tip of each. Abdomen mottled, with broad central bands on all the segments and marginal areas, the fan-shaped hairs confined to the brown areas. Cornicles enclosed in a brown area. Cauda markedly knobbed; anal plate bilobed. Legs with femora of first and second pairs markedly thickened; the length of hind leg: trochanter .07 mm.; femur .33 mm.; tibia .56 mm.; tarsi .19 mm.

Length 1.9 mm.

"Described from 1 apterous ♀, 1 pupa and 1 alate ♀ in the Walker collection" (Laing).

Walker's original description is as follows:—

"*The wingless viviparous female.* The body is small, rather flat, oval, yellow; the antennæ are black towards the tips and about half the length of the body; the eyes and the tip of the rostrum are black; the tubes have black tips and are hardly one-fourth of the length of the body; the tarsi and tips of the tibiæ are black. Found with the preceeding (*Aphis certa*) in the autumn at Fleetwood. Aphides on Wild's Heart's-ease (*Viola tricolor*)."

Laing says: "It is with considerable hesitation that I attribute this species to Walker. He says that his *insessa* was found on *Viola tricolor* and he describes only the apterous viviparous ♀. The species here described, however, stands under *insessa* Walker, in our collection, but the card bears the label 'sea wormwood' in what appears to be Walker's handwriting. The specimens were mounted in the same way as the rest of Walker's material and it is very improbable that any mistake could have been made as to the labelling. It is more likely that Walker misrecorded it from *viola*."

Later (Entomologist, October, 1928) Laing says: "The material upon which a description of *Saltusaphis insessa* was based was both scanty and in very poor condition and it is with some hesitation that I assign two batches of material to this species, but provisionally I do so. Dr. Morison found it on *Juncus maritima* at Newburgh and Mr. Britten at Burton Point, in Cheshire on *Juncus*."

SALTUSAPHIS FAMILIARIS Walker.

Aphis familiaris Walker (nec. Theobald).*Aphis adscita* Walker ?

Walker, Zoologist, VI., 2220 (1848) ; Laing, Ent. Mo. Mag., LVII., 125 (1921).

Immature female. "Antennæ about two-thirds the length of the body ; proportions of segments 5, 4, 15, 9, 10 (6 + 10) ; total length 1.18 mm. Head rather strongly chitinised, except for a central longitudinal streak. Thorax and abdomen with a series of chitinous areas, more or less circular, arranged roughly in longitudinal rows, each area having at least one fan-shaped hair ;

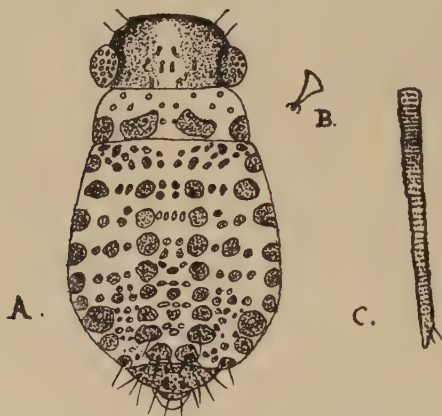


Fig. 30.—*Saltusaphis familiaris* Walker.

A. Immature ♀ ; B. Fan-like hair ; C. Apical antennal segment (after Laing).

standing out prominently are four rows of large areas, two medio-lateral, and the marginal ; the chitinous areas, taken transversely, correspond to the segments which are very faintly visible. Cornicles situated in a heavily chitinised area. Legs short, thick, the femora of the first and second pairs much swollen, the hind tibiæ thicker than either of the other pairs ; lengths of hind leg : femur .36 mm. ; tibia .48 mm. ; tarsus .16 mm.

Total length 1.6 mm." (Laing).

Walker's original description is as follows : "*The wingless viviparous female.* The body is small, oval, buff, smooth, shining

and rather flat ; the back is finely granulated and slightly variegated with red and green ; the antennæ are pale yellow, black towards the tips and less than half the length of the body ; the rostrum is pale yellow ; its tip and the eyes are black ; the tubes are pale yellow, with black tips and about one-twelfth the length of the body ; the legs are pale yellow and rather short, the tarsi and the tips of the tibiæ are black."

FOOD PLANT. *Lycopsis arvensis*.

LOCALITY. Fleetwood, Lancashire (Walker).

Observations. Mr. Laing has re-described Walker's *Aphis familiaris* from his type in the British Museum. Thus this species is definitely fixed. From the original description no one could have imagined it was a *Saltusaphis*. This species has not been found since Walker described it. The insect I took to be Walker's *familiaris* found on *Lycopsis* is an *Anuraphid* and I have placed it with *helichrysi* (*padi*).

SALTUSAPHIS ORNATUS Theobald.

Ent. Mo. Mag., LXIII. 30 (1927).

Alate viviparous female. Head and thorax orange ; head with a dark area each side down to the eyes ; pronotum with a brown



Fig. 31.—*Saltusaphis ornatus* Theobald.
Alate viviparous ♀.

area each side in front and two small dusky patches on dorsum ; mesothoracic lobes bright brown. Abdomen vivid pale green and yellow, with 7 large dusky patches each side, the sixth surrounding the cornicles and dusky grey median ornamentation as

shown in figure. Cauda and anal plate dusky, especially the former. Antennæ deep brown; segments i. and ii. paler brown. Legs same colour as body to slightly darker, apices of femora and tibiæ brown; tarsi brown; hind femora brown, especially on one



Fig. 32.—*Saltusaphis ornatus* Theobald.

Alate viviparous ♀ fore and hind wings, head and antenna.

side. Antennæ shorter than body; i. longer and wider than ii.; iii. a little longer than iv., with 13 round sensoria up to the end; iv. a little longer than v.; vi. equal to iv., base long, flagellum one-third less of base. A few simple hairs on crown and frons. Rostrum very short and thick, pale yellow. Cornicles dusky, slightly elevated, surrounded by black. Cauda knobbed, with several hairs. Anal plate bilobed. Hairs on sides of the pronotum

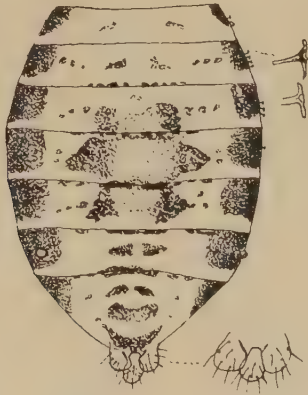


Fig. 33.—*Saltusaphis ornatus* Theobald.

General body markings of alate ♀; cauda and anal plate and enlarged hairs.

and a few also on the dark lateral patches of the abdomen mushroom shaped. Venation normal for the genus ; stigma dusky ; veins brown, with very faint clouding at apices.

Length 2 mm.

LOCALITY. Wye, vi. 26.

Observations. A very beautiful ornate species swept from oats by Mr. Newton. Several attempts to get more specimens by sweeping the same oats failed.

Type in the writer's collection.

Genus THRIPSAPHIS Gillette.

Gillette, Canadian Entomologist, 49, 193 (1917) ; Baker Bull. 826, U.S. Dept. Agric., 30 (1920).

Cornicles present as pores or on very slight elevations. Body elongate. Legs rather short and thick. Eyes with no ocular processes. Antennæ of 6 segments ; alate sensoria round. Cauda knobbed. Anal plate markedly divided. Wings normal, but now and then the hind wings are devoid of the cubitus. In some the body hairs are spine-like, in others they are fine. Males and oviparous females apterous. Found free living on reeds, grasses, etc.

A single species only occurs in Great Britain—*Thripsaphis cyperi* Walker.

THRIPSAPHIS CYPERI Walker.

Aphis cyperi Walker.

Walker, Ann. Mag. Nat. Hist., II., Se. 2, 45 (1848) ; Laing Ent. Mo. Mag., LVII., 120-123 (1921).

The following is Walker's description :

"*Apterous viviparous female.* Dull green ; spindle shaped, rather flat. Antennæ brown, three-quarters length of body ; fourth segment half length of third ; fifth as long as fourth ; sixth more than half length of fifth ; seventh much longer than sixth. Nectaries do not rise above surface of body. Legs yellow, rather short ; feet and tips of shanks black. *Alate female.* Coloured as above, but head and disc of thorax brown. Antennæ black, as long as body. $1\frac{1}{2}$ line body, $3\frac{3}{4}$ wings. On rushes in autumn near Belfast. (Walker.)"

Laing has re-described this species as follows :

"*Apterous viviparous female*. Elongate, narrow, rather flat, green with black marginal areas on all the abdominal segments, on the mesothorax, front of the head and at the base of the antennæ. All the segments distinct, body constricted at the third abdominal segment, with roughly two irregular, lateral longitudinal rows of black spots and a broad, median, pale green longitudinal streak. Antennæ very dark green to black, basal segment pale, segments i. and ii. sub-equal, iii. nearly equal to the sum of the two following, iv. and v. equal, vi. with the base and spur nearly equal, segment iii. with from 2 to 5 small circular sensoria at the distal third ; proportions 6, 5, 39, 18, 17 (10 + 8) (some specimens 9 + 9) ; total length 1.96 mm. Head with front convex, two spines lateral, a gland in the convexity, strongly chitinised, another at the base of the antennæ and another situated behind the eyes near the hind margin, the latter not in a dark patch. Eyes without ocular processes. Rostrum 3-segmented, reaching almost to the middle of the metathorax. Pro- and mesothorax incompletely separated ; prothorax with a gland contained in a small black area laterad of the median line ; mesothorax with a longitudinal black streak laterad and a black area on the margin. Metathorax with a black, latero-frontal area and also a marginal one ; the head, pro- and mesothorax and the metathorax about equal in length. Abdomen with the whole of the upper surface uniformly covered with small, circular pores, which in cleared specimens become very faint towards the middle line and ultimately disappear ; they are very evident in the chitinised areas and on the whole of the last two segments, Cornicles, mere pores on the seventh abdominal segment. Cauda knobbed ; anal plate bilobed ; gonapophyses 2. Whole body practically glabrous. Legs fairly long, tibia only moderately hairy ; length of hind leg : femur .6 mm. ; tibia .8 mm. ; tarsus .18 mm. Total length 3.9 mm. ; breadth 1.2 mm.

"*Alate female*. Very elongate, narrow, dull green. Antennæ black, proportions of the segments 5, 4, 26, 15, 15, the last segment with its spur broken off ; segment iii. has 13 sensoria arranged along its whole length, either circular or elliptical, each double contoured. Head brown, rather long and narrow, with a quadrate projection in front and two large lateral sensoria. Eyes without ocular processes. Prothorax with a wide marginal band, the

mesotergal bosses and the scutellum densely chitinised and covered with small oval pits. Rostrum very short, 3-segmented, reaching the mid-coxæ. Wings normal aphidine, all veins well

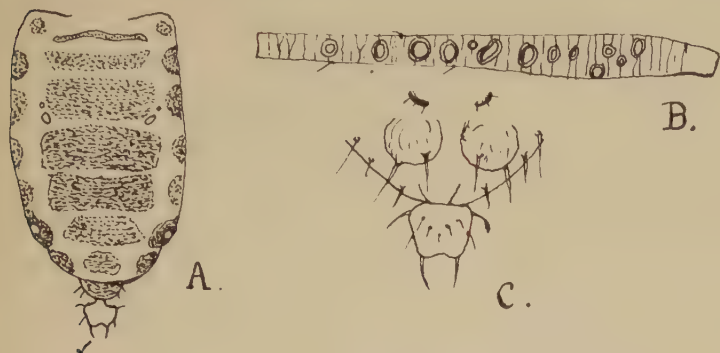


Fig. 34.—*Thripsaphis cyperi* Walker.

A. Body; B. Third antennal segment of alate ♀; C. Cauda, anal lobe and gonapophyses (after Laing).

marked. Abdomen with 6 bands of strong chitin, interrupted into a broad central and a narrow marginal area, the chitinised areas covered with small oval pits. Cornicles mere pores, surrounded by a densely chitinised area. Cauda knobbed; anal plate bilobed; gonapophyses 2. Abdomen with scarcely any hairs. Legs long, robust; tibiae moderately clothed with hair. Hind leg: length of femur .96 mm.; tibiae .84 mm.; tarsus .18 mm. Total length 2.64 mm." (Laing.)

Oviparous female. Apterous. Light brown; anterior part of body frequently lighter and more greenish-brown; divisions of the segments all yellow, with their margins less defined on the sides, where the yellow area is wider in each segment; the segmental divisions are also marked with dark lineal streaks. Cornicles as small yellow pores. Apex of body brown. Antennæ blackish-brown. Legs brown. Eyes dark red. Venter yellow. Body with a very few short hairs, only seen under the microscope. Usually a pale undefined line in the middle of the anterior segments. Antennæ of 6 segments, from a little under to a little more than one-half length of body; segment i. larger than ii.; iii. longer than iv.; iv. about one-half of iii. and equal to v.; vi. longer than v., basal area nearly as long as flagellum. Eyes

large, no ocular process. Rostrum thick, not quite reaching second coxæ. Legs thick and rather short; hind tibiæ with many sensoria, not quite reaching to apex. Cauda somewhat quadrangular at the swollen end, with a few short hairs. Anal plate retracted, bilobed, with a few short hairs.

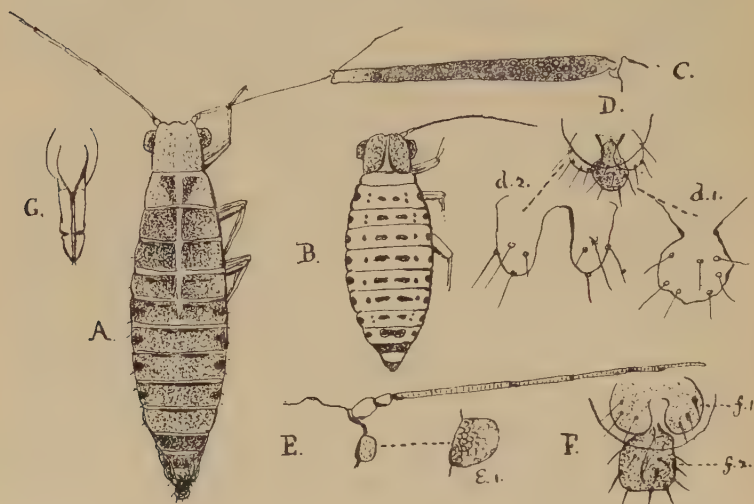


Fig. 35.—*Thripsaphis cyperi* Walker.

A. Oviparous ♀; B. Young oviparous ♀; C. Hind tibia; D. Cauda (d.1) and anal plate (d.2); E. Head of apterous ♀; (e.1) Eye; F. Cauda (f.2) and anal plate (f.1).

Length 1.8 to 2 mm.

Larval oviparous female. Smaller and broader than mature female. Yellow with brown areas, brown spots and dots as figured. Cornicles as yellow pores, in centre of a brown spot. Legs and antennæ brown. Like the adult this is covered completely with white tomentum. One specimen found by Miss Jackson was unicolourous pinkish-grey, another light pink with brown spots. The antennæ are more than half as long as body; segment i. larger than ii.; iii. nearly twice as long as iv.; iv. and v. equal; vi. longer than v., basal area longer than flagellum. Rostrum very broad, reaching just past second coxæ. Legs short and thick; tibiæ with a few stiff short hairs. Cauda triangulate at the knobbed end.

FOOD PLANTS. Rushes (Haliday) ; *Aira cæspitosa* (Laing) ; *Carex goodenovii* (D. J. Jackson).

LOCALITIES. Belfast (Haliday) ; Kyle, N.B. (D. J. Jackson) ; Monymusk, Aberdeenshire, viii. 20 (Laing).

Observations. This very marked species was sent me by Miss Jackson. I have appended Walker's description and Laing's more detailed re-description of the apterous and alate viviparous females. He says that the apterous females he found differ from Walker's description, for Walker makes no mention of any black markings. But a careful comparison with the type leaves no doubt that his specimens belong to the same genus. When alive, Laing says the insect is covered with long white filaments, readily soluble in alcohol. At first sight it bears a strong resemblance to a Coccid. It readily falls to the ground when the leaf upon which it is feeding is touched. The insects were found by Miss Jackson in marshy ground. In her notes sent me she says, " They are most extraordinary insects ; they were found singly, resting on the leaves near the tips. They were quite conspicuous, being covered with greyish-white tomentum. The moment the grass was touched they fell off." The specimens she sent me were all oviparous females, which I have described here, together with her colour notes. She found the small linear ova, oval in shape, covered with a whitish-green tomentum, on the leaves. There is little doubt that these are the oviparous *cyperi*. One or two apterous viviparous females taken with them were also sent and the short description I drew up is as follows : " Elongate and *Thrips*-like, as in the oviparous female. Antennæ about half of body, proportions much the same as in the oviparous female. Rostrum just reaches second coxæ. Cauda markedly knobbed, apex rounded, anal plate bilobed, both with a few bristles. Hind tibiæ narrow, narrower than fore and mid, all with many short hairs, one marked one on each first tarsal segment and shorter ones on the second tarsals. Cornicles slightly more raised than in the oviparous female.

Length 2 mm.

The *Thrips*-like appearance is very marked.

Tribe VACUNINI.

In this tribe the thorax of the alate females never has the lobes prominently developed and the oviparous females are small

and usually lay but a single egg. Wax glands are large. Baker places the two genera *Vacuna* (*Thelaxes*) and *Glyphina* in the tribe he calls *Thelaxini*, which is here called *Vacunini*; others have placed them in the *Eriosomatini*. They seem to me to approach more closely the *Hormaphidini*, but they have distinct cornicles, which are absent in the latter.

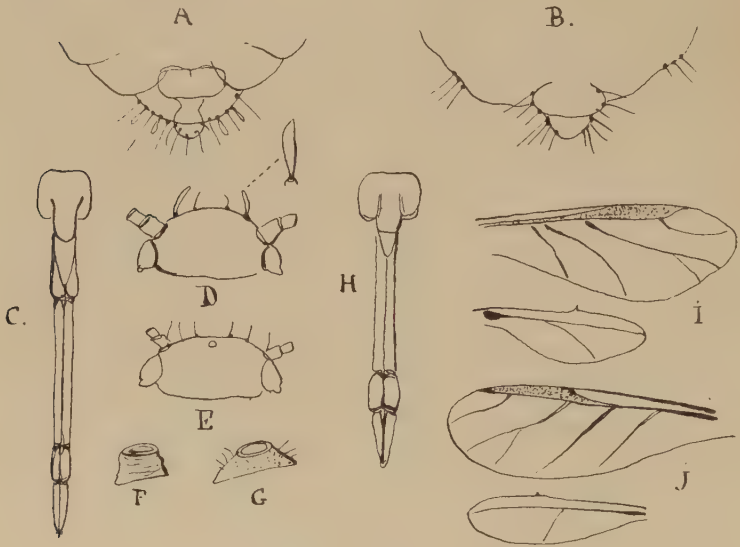


Fig. 36.—*Vacuna* and *Glyphina*.

A. Cauda and anal plate of apterous ♀ *Vacuna*; B. of *Glyphina*; C. Rostrum of *Vacuna*; D. Head of *Vacuna*; E. Head of *Glyphina*; F. Cornicle of *Vacuna*; G. of *Glyphina*; H. Rostrum of *Glyphina*; I. Wings of *Vacuna*; J. of *Glyphina*.

The antennæ are of five segments, sensoria oval or round in the alatæ. Cornicles present on shallow cones or on raised chitinous rings. Cauda somewhat markedly knobbed or may be semi-circular in form. Body with stout spines or narrow leaf-like ones or hairs. The sexuales are all small and apterous. There are two genera :—

1. *Vacuna*, with distinctly knobbed cauda.
2. *Glyphina*, in which the cauda is never knobbed, but is circular.

Both occur in Great Britain.

Genus VACUNA Heyden.

Thelaxes Westwood.

Heyden, Mus. Senkenberg, II., 289 (1837); Westwood, Intro. Mod. Class. Ins. Synop., II., 118 (1840); Buckton, Mono. Brit. Aphid., IV., 7 (1882); Van der Goot, Holland. Blattläuse, 422 (1915); Tullgren, Arkiv. f. Zool., V., 14, 35 (1909); Baker, Bull., 826, U.S. Dep. Agri., 20 (1920).

Antennæ of five segments in apteræ; alatae with circular or oval sensoria. Cauda distinctly knobbed. Anal plate rounded. Fore wings with media once forked; no cubitus to hind wings. Cornicles short, on broad low cones. Sexuales small, apterous. *Type dryophila* Schrank.

VACUNA DRYOPHILA Schrank.

Aphis dryophila Schrank.*Vacuna dryophila* Heyden.*Thelaxes quercicola* Westwood.*Cinara quercus* Mosley.*Thelaxes dryophila* Buckton.*Vacuda* Amyot.

Schrank, Fn. Boica, II., 113 (1801); Heyden, Mus. Scenk., II., (1837); Westwood, Mod. Class. Ins., Synop, II., 178 (1840); Kaltenbach, Mono., Pflanz., 177 (1843); Koch, Die Pflanz., 256, figs., 331-334 (1857); Buckton, Mono. Brit. Aphid., IV., 8 Pl., cxv., figs. 1-7 (1882); Lichtenstein, Les Pucerons, 26 (1885); Horvath, Fn. regni., Hung. Hemip., 63 (1897); Del Guercio, Prosp. d. Aphid., Ital., Nuove relaz., Se. I., 2, 85 (1900); Schouteden, Ann. Soc. Ent. Belg., XLIV., 137 (1900); and Mem. Soc. Ent. Belg., XII., 192 (1906); Tullgren. Arkiv. f. Zool., 14, 36 (1909); Van der Goot, Holland. Blattläuse, 422 (1915).

Alate viviparous female. Head and thorax shiny black to deep shiny brown; pronotal band pale brown. Antennæ brown, rather short. Abdomen shiny, dull green to yellow green, more or less mottled. Eyes and ocelli reddish-brown; eyes large. Legs greenish to ochreous-green; tarsi dark. Cornicles very small, brown. In some the whole colour is brown, with legs pale brown to yellow. Now and then entirely

brown specimens occur, with black thoracic lobes and black pronotal markings; more rarely red hues occur on the pronotum, the abdomen and venter. Wings of moderate size and very iridescent, with somewhat rounded apices; the iridescent colours vary in individual specimens and in certain lights; some have violet hues, others a metallic green sheen; when sedentary they are folded flat on the body. Venation as shown in figure. Head with two marked broad, acuminate hairs

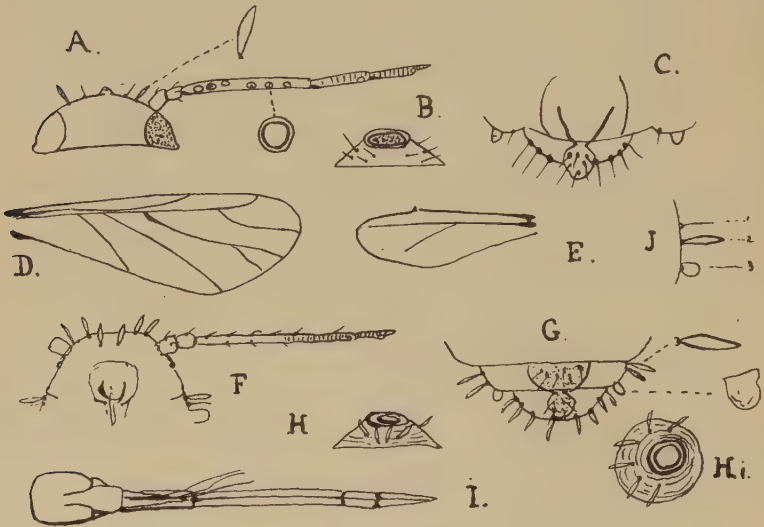


Fig. 37.—*Vacuna dryophila* Schrank.

A. Head and antenna of alate viviparous ♀; B. Cornicle; C. Anal plate and cauda; D. Fore wing; E. Hind wing; F. Head and antenna of apterous ♀; H. and H.i. Cornicle; I. Rostrum; J. Lateral hairs; G. Cauda and anal plate.

and two median simple ones. Antennæ thin, of five segments, about as long as thorax; segment i. a little wider than ii., no longer; iii. longer than iv. + v., with five to seven rather large round pale sensoria; iv. about as long as v., with a round sub-apical sensorium; flagellum of v. very small. Median ocellus prominent. Head with two broad lanceolate hairs and two median hairs. Cornicles rather flattened, broadly expanding basally, with a few hairs on the sides. Anal plate rounded, dark, with

a few hairs. Cauda markedly knob-shaped, the knob much constricted at base with a broadly expanded basal area, hairs simple. Body hairs simple. Legs moderate, with many thin pale hairs. Two papillæ on posterior end and traces of two smaller ones near them.

Length 1.3 to 1.8 mm.

Apterous viviparous female. Oval to almost round, flat, with marked segmentation. Colour varying from rich deep brown to reddish-brown, greenish-brown to green, with a pale, more or less distinct yellow line in the middle extending from head to apex; on each side are five darker areas, with pale borders. Antennæ and legs same colour as body. Cornicles small and pale. Eyes very small, black. Body with hairs and swollen spines. Antennæ about one-third length of body; segment i. wider but no longer than ii.; iii. longest, much longer than iv. + v., with a few hairs as figured; iv. about as long as v., the latter with very small blunt flagellum. Eyes very small, of very few facets; no ocular process. Rostrum reaching just past second coxæ. Anal plate rounded, with six broad lanceolate spines at its edge. Cauda markedly knob-shaped; the base widely broadened, spinose and with some long hairs. Abdomen with four small tubercles or papillæ on each side and with a few hairs and broad spine-like hairs. Cornicles cone-like, with six broad spines and with marked annular striation. Legs with a few hairs on the tibiæ. Cuticle granular.

Length 2.2. to 2.8 mm.

Oviparous female. "Oval, wholly dingy green with brownish stains and streaks passing behind the eyes and over the thorax. Abdomen with four rows of brown spots and swollen dots on each side, marking the sites of certain pores other than the stomata, which last are placed on the inferior surface of the body. Legs and antennæ short. The abdominal cavity of the specimen described was entirely occupied by two large yellow eggs, the safe delivery of which is a mechanical marvel.

Length .88 × .50 mm."

Male. "Oval. Colour, lemon yellow. Antennæ sooty grey. Abdomen greenish, with a double row of dorsal spots. Antennæ and legs rather long." (Buckton.)

FOOD PLANTS. Oaks (*Quercus spp.*).

LOCALITIES. Kingston-on-Thames ; Richmond Park, 1880-1890 ; Guildford, 30 v. 13 ; Woking, 7 v. 11 ; Shadoxhurst, vi. 26 ; Wye, vi., vii. 04-28 ; Bearsted, 27 iv. 14 ; Linton, Kent, vi. 10 ; Hastings ; Guestling, Sussex ; Madingley, Cambs., 7 vi. 87 ; Great Staughton, Hunts. ; Woburn, Beds. ; Widdington, Essex ; Little Hadham, Herts. ; Brockenhurst, viii. 13 ; Exeter, 4 vii. 10 ; Filey, Yorks., 1884 ; Chepstow ; Ross ; Criccieth, N. Wales (F.V.T.) ; Great Salkeld, 7 vi. 12 (Britten) ; Isle of Man (Walker) ; Haslemere, Eastbourne, Southgate, Epping Forest (Buckton). Common all round London, New Forest, Chiltern Hills, Epping Forest (Laing). France, Belgium, Holland and Germany.

Observations.—I have always found this Aphid under the leaves and on the top shoots of the oaks in May, June, July and August. The alate females appear in late June and July. Where the alatae fly to we do not know. Buckton states that at Montpellier *Vacuna* (*Thelaxes*) would seem to show migratory habits, like *Phylloxera*. In summer the parthenogenetic forms give rise to the agamous generations on *Quercus ilex* and in December these winged individuals give birth to the sexed insects on *Quercus pubescens*. The galls on the leaves of the oak are occasionally tenanted, not only by *Cynipidæ*, but also by the larvæ of *Thelaxes dryophila*. Passerini noticed the same habit in July. The minute sexuales occur in November and December. Buckton describes the small male as rostrate, but on the Continent they are said to be arostrate. This aphid is frequently largely attended by ants, notably by *Acanthomyops fuliginosa*, and I have one alate female taken by Donisthorpe in the nest of this species at Woking in June.* It is preyed upon by Hemerobiid larvæ and Buckton says the eggs are greedily devoured by a species of *Scymnus*. Walker counted upwards of one thousand larvæ of *Vacuna* under one oak leaf in the Isle of Man. This large number was reduced to ten individuals within the space of two days through the voracity of a single *Scymnus* larva. In 1926 I found it in masses on the tips of dwarf oaks and the shoots of felled trees at Shadoxhurst and they covered the leaves below them with sticky honey-dew.

* In a letter to Laing, E. E. Green says that at Camberley he has observed *Vacuna* clustering around oak galls and attended by ants which constructed an earthen shelter for them.

Genus GLYPHINA Koch.

Koch, Die Pflanz., 259 (1857); Buckton, Mono. Brit. Aphid., IV., 15 (1883); Van der Goot, Holland. Blattläuse, 425 (1915); Baker, Bull., 826, U.S. Dep. Agri., 21, pl. iii. G to L (1920).

Antennæ of five segments, setose, sensoria in alatae rounded. Cornicles on raised discs. Cauda and anal plate rounded, never knobbed. Body hairs numerous. Wings with media of fore pair once forked; hind wings with media only present. Rostrum rather long and acuminate. These aphids live on foliage and are more or less gregarious. Two species occur in Great Britain.

1. *Glyphina alni* Schrank.

2. *Glyphina pilosa* Buckton.

The first is the type of the genus.

GLYPHINA ALNI Schrank.

Aphis alni Schrank.

Vacuna betulæ Kaltenbach.

Vacuna alni Passerini.

Tremulinax Amyot.

Glyphina betulæ Koch.

Thelaxes betulina Buckton.

Thelaxes alni Schouteden.

Glyphina alni Del Guercio.

Schrank, Fn., Boica, II., 107 (1801); Kaltenbach, Mono. Pflanz., 177, figs. 19-21 (1843); Koch, Die Pflanz., 260, figs. 335-336 (1857); Passerini, Aphid. Ital., 83 (1863); Buckton, Mono. Brit. Aphid., IV., 17 (part) (1883); Trans. Ent. Soc., Lond., Pt. III., 325, Pl. VI., figs. 1-6 (1886); Del Guercio, Prosp. d. afidofauna, Nuove relaz., Se. I, 2, 84 (1900); Schouteden, Ann. Soc. Ent. Belg., XLIV. 137 (1900), and XII. 192 (1906); Tullgren, Arkiv. f. Zool., 14, 42, figs. 10-12 (1909); Van der Goot, Holland. Blattläuse, 425 (1915),

Alate viviparous female. Dusky green to dark green; head and thorax dark brown, in some almost black. Abdomen with darker markings and in some with two white patches on each side; dark lateral spots. Cauda, anal plate and cornicles dark. Legs deep green to greenish brown, also antennæ. Abdomen tuberculate. Antennæ of five segments, not so long as head and

thorax; segment i. a little longer than ii.; iii. the longest, slightly longer than iv. + v., with 5-7 round sensoria and several long hairs; iv. a little shorter than v., now and then a small sensorium near the primary one. Flagellum very short and blunt, with a few short terminal spines; all segments with minute speck-like striæ. Head rounded in front with four single hairs and a marked median ocellus. Rostrum acuminate, reaching to

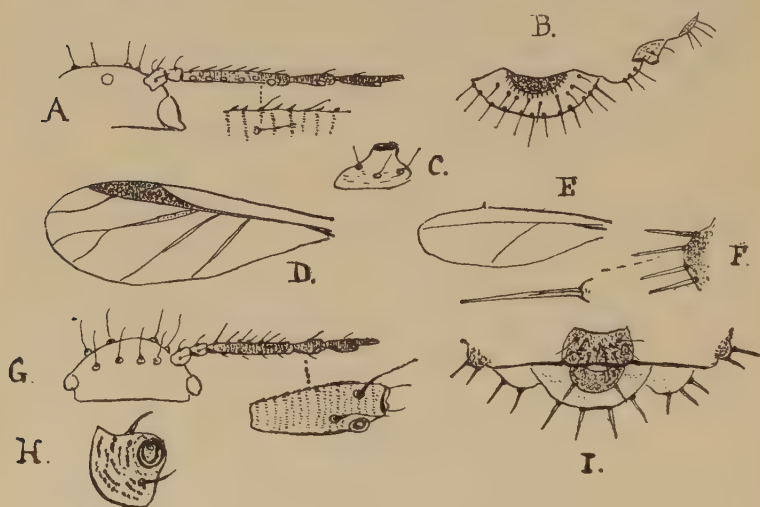


Fig. 38.—*Glyphina alni* Schrank.

A. Head and antenna of alate viviparous ♀; B. Apex of body; C. Cornicle; D. Fore and E. Hind wing; F. Lateral hairs, of apterous ♀; G. Head and antenna of apterous ♀; H. Cornicle; I. Apex of body.

third coxæ. Anal plate and cauda rounded, the former with long, latter with short hairs. Cornicles short and truncate, with much broadened base and three hairs towards the middle. Costa green; stigma greenish-brown; veins dark brown and folded horizontally in repose; media of fore wings normally once forked, now and then simple; hind wings with media only.

Length 1.3 to 1.8 mm.

Apterous viviparous female. Dark green to olive green, brown or bright green, a paler median line and two marked white broad bars on each side, the anterior pair smaller than posterior and a third median, narrower and longer mark; segmental

divisions are also paler and in some may be white flecks at the sides of body ; more or less rounded or oval. Body with many short spine-like hairs. Antennæ short, from one-third to rather less the length of the body, brown ; segment iii. pale, in some almost white ; of five segments ; segment i. wider but no longer than ii., iii. longest, about as long as iv. + v. ; iv. not quite so long as v., in some only a little more than half the length, with a marked sub-apical sensorium and it is somewhat enlarged apically ; v. with a small blunt flagellum and usual sensorium ; all the segments show minute specked striæ and on the third several hairs, one or more on the remaining segments. The rounded head has four long hairs in front and four in a line behind. Eyes small. Rostrum yellowish green, brown at base and apex, long and narrow, reaching past third coxæ. Cornicles small, cone-shaped and truncate, with small specked lines and two or more hairs. Cauda and anal plate dark, the former rounded, the latter broad and with sloping sides and many hairs ; cauda minutely spinose and with two hairs ; hairs as on the rest of the body, broad and spine-like. Legs rather thick ; tibiæ paler, in some pale green, in others almost white, with many outstanding hairs. Venter pale.

Length 1.4 to 1.8 mm.

FOOD PLANTS. *Betula alba* ; *Alnus incana* and *Alnus glutinosa*.

LOCALITIES. Guestling, near Hastings (Bloomfield) ; Wye, 17 viii. 13 ; Ashford, Kent, 20 vi. 13 ; Shadoxhurst, vi. 25 ; Guildford, 14 vii. 14 ; Lyndhurst, viii. 15 (F.V.T.) ; Cadnam and Romsey, Hants. ; Epping Forest (Laing) ; Camberley (Green). Holland (V. d. Goot) ; Belgium (Schouteden) ; Italy (Del Guercio, etc.) ; Germany.

Observations. Very variable in colour and ornamentation. The young apteræ are often all delicate green and may gradually darken to almost black. The four prominent white areas on the abdomen vary in size, in some the caudal pair unite and form a band, in others they are almost absent. It may be found in June, July and August and clusters near the tips of the shoots and to a less extent under the leaves. Alatæ appear about mid-June and by the end of July none can be found, but apteræ persist until the end of August and they occur again plentifully

in October into November. The species *betulæ* described by Buckton in his Monograph of British Aphides is not *Glyphina betulæ* or a *Glyphina* at all. It appears to be a *Pemphigid*.* It bears no resemblance to the *betulæ* of Kaltenbach. On the other hand his *Thelaxes betulina* (Trans. Ent. Soc. Ann. 1886, Pt. III., 326) is this species. Koch undoubtedly describes it as *Glyphina betulæ* (Kalt.) but the venation of the female (Pl. xlvii., fig. 335) is abnormal. It occurs on Alders and Birch and there is little doubt that Schrank's *Aphis alni* is the same as Kaltenbach's *Vacuna betulæ*. Passerini spoke of it as *Vacuna alni* (Aphid. Italicæ, 83 a.p.). Del Guercio also as *Glyphina alni*.

Schrank's original description (Fn. Boica, II., 107, 1190, 1801) is appended :

"*Aphis alni*.

"*Wohnort* ; au den Zweigen und Blattstielen der Erle.

"*Ann.* Rothbraun, oder (die jungern) blassgrün, eyförmig, flach. Ueber den Rücken hinab eine Linie, und beyderseits zween Punkte oder querstriche weisslicht. Kein Schwänzchen am After, Keine Saftspizen."

GLYPHINA PILOSA Buckton.

Buckton, Mono. Brit. Aphid. IV., 16 (1882).

Buckton's description is as follows :

"*Apterous female*. Body oval, globose. Dark olive green or blackish, pilose, and flecked with white down, which is most plentiful on the apical rings. Eyes dark brown. Cornicles black and inconspicuous. Legs stout, pale olive green, tarsi long, rostrum rather short. The down on this insect is pale greenish. Size of body 1.77 × 1.01 mm.

"*Winged viviparous female*. Body rather linear. Head and thorax dark brown and shining. Abdomen smooth, carinated, oval, greyish drab. Hind legs long. Wings long and narrow, fuscous, and somewhat wrinkled, dull. Insertions, cubitus and stigma pale greenish. The other veins are pale ochreous and usually very indistinct. The third or cubital vein unforked, and often it does not anastomose to the cubitus. Stigmatic vein straight, and leaves the stigma at about an angle of 45°. Stigma

* An examination of Buckton's slide of *Glyphina betulæ* shows that his specimens are really *Pemphigus bursarius* (L.) (F. Laing].

long and pointed. Size of body 1.77×0.88 mm. Expanse of wings 5.74 mm.

"Numerous during some seasons at Haslemere, on the Scotch Fir, throughout the months of July and September. Mr. Walker sent me specimens feeding on *Pinus sylvestris* at Southgate, all of which in the alate forms showed the non-furcate cubitus. He supposed the insect to be *Lachnus pineti* Kalt., which, however, has distinctly a double furcation in the upper wing." Buckton goes on to say, "Koch has described an insect under a new name or genus *Mindaurus* or *Mindarus*, which has some characteristics in common with *Glyphina pilosa*, but this last Aphis, nevertheless, does not agree with his *Mindarus abietinus*, notwithstanding their similar habits."

I have not seen any living mature specimens that might be this insect, so am unable to place it.*

Tribe LACHNINI.

This tribe has the cornicles on broad flat cones, which are provided with hairs; antennæ of six segments; hairy; flagellum short and "nail" like. Body normally hairy; cauda and anal plate rounded. Rostrum typically of five segments. Males alate; viviparous females apterous.

They are mostly found on trees, especially Conifers, a few on Willows, Fruit trees and Roses. One sub-tribe *Tramina* live in the soil, on the roots of plants, and are especially attended by ants, which may even shelter them in their formicaries. One true Lachnid also feeds on the roots of roses (*Pterochlorus rosæ* Chol.). This tribe has been divided by Baker into five sub-tribes, which tabulate as follows:—

- | | | |
|---|--|---|
| 1 | Radial sector of fore wings curved and of moderate length | 2 |
| | Radial sector of fore wings short and straight, situated near the tip of the wings | 4 |

* This species is not represented by any slide in the Buckton Collection in the British Museum (F. Laing). Mr. Laing finds three slides of Buckton's in the British Museum labelled *Mindarus abietinus*. Buckton never recorded this insect and the probability is these are his slides of *pilosa*. Swain (Ent. News, xxxii. 212, 1921) points out that these are *tomentosus* and Mr. Laing says the evidence is strongly in favour of *pilosa* being *tomentosus*.

- 2 Hind tarsi extremely elongated ; head divided ; wing venation usually faint *Tramina.*
Hind tarsi normal 3
- 3 Stigma short and thick ; sexes apterous *Anæcina.*
Stigma elongate ; males often alate *Pterochlorina.*
- 4 Form elongate and very narrow ; antennæ with bristles ; cornicles not hairy ; eyes without ocular tubercles *Eulachnina.*
Form not elongate ; cornicles on hairy cones ; eyes with ocular tubercles *Lachnina.*
All these sub-tribes are represented in Great Britain.

Sub-tribe ANÆCINA.

The stigma is short and thick and the sexes are both apterous ; radial sector of fore wings curved and of moderate length. Two genera are placed here by Baker, *Anæcia* and *Nippolachnus*.

In *Anæcia* the eyes have prominent ocular tubercles and the stigma is short and rounded ; in *Nippolachnus* there is no ocular tubercle and the stigma is long and straight. The former only occurs in Great Britain. In many respects this genus approaches the Pemphigini, where it has been placed by many authors ; the structure of the antennæ place it in the Pemphigini, but the venation and structure of the cornicles in this tribe.

Genus ANOECIA Koch.

Schizoneura Kaltenbach.

Koch., Die Pflanz., 275 (1857) ; Kaltenbach, Mono. Pflanz., 167 (a.p.) (1843) ; Passerini, Aphid. Ital., 68 (a.p.) (1863) ; Buckton, Mono. Brit. Aphid., III., 88 (a.p.) (1881) ; Del Guercio, Prosp. d. afido. ital. Nuov. rel., Se. 1, 2, 102 (a.p.) (1900) ; Mordwilko, Ann. Mus. Zool. d. l. Acad. Imp. d. Sc. St. Petersburg, XIII., 369 (1908) ; Tullgren, Arkiv. f. Zoologi., 14, 186 (1909) ; Van der Goot., Beit. z. Kennt. d. Holl. Blattlause, 506 (1915) ; Baker, Bull., 826, U.S.A. Dept. Agri. 13 Pl. I., A.F. (1920).

Cornicles very small, placed on broad hairy cones. Antennæ of six segments, with sub-circular, oval or elongate sensoria ; hairy. Head rounded to some extent in front, not divided. Cauda and anal plate rounded. Eyes prominent. Wings with

media once branched in fore pair ; stigma short and thick ; hind pair with both media and cubitus present. Males and oviparous females apterous. Rostrum well developed in all stages. Females lay from one to four ova each. Live in colonies above ground and in the soil.

The type of the genus is *Aphis corni* Fabr.

Two species occur in Great Britain :—

1. *Anæcia corni* Fabricius.

2. *Anæcia pskovica* Mordwilko.

ANOECIA CORNI Fabricius.

Aphis corni Fabricius.

Schizoneura corni Kaltenbach, etc.

Anæcia corni Koch.

Schizoneura venusta Passerini.

Schizoneura graminis Del Guercio.

Schizoneura vagans Koch.

Schizoneura cornicola Walsh ?

Anæcia willcocksii Theobald ?

Fabricius, Ent. Syst. IV. 214 (1774) ; Syst. Ent., 736 (1775) ; Sp. Ins., II., 385 (1781) ; Mant., Ins., II., 315, (1787) ; Gmelin, Ed. Linn. Syst. Nat., I., 2204 (1787) ; Schrank, Fn. Boica, II., 106 (1801) ; Rossi, Fn. Etrusc., 261, 1376 (1807) ; Hartig, Germ. Zeit., III., 367, pl. 1, figs. 23 and 24 (1841) ; Fonscolombe, Ann. Soc. Ent., Fr. X., 188, 30 (1841) ; Kaltenbach, Mono. Pflanz., 168 (1843) ; Walker, List. Hom. IV., 1047 (1852) ; Koch, Die Pflanz., 268, fig. 343 (*vagans*) ; 275, figs. 348, 349 (*corni*), 1854 ; Passerini, Gli. Afidi., 38 (1860) ; Aphid. Ital., 68 (1863) ; Ferrari, An. d. Mus. Civ. d. Stor. Nat. d. Genova, II., 82 (1872) ; Buckton, Mono. Brit. Aphid., III., 107, Pl. cx., figs. 1-4 (1880) ; Kessler-Jahrer d. Vereins, f. Nat. z. Kassel XXIX. and XXX. (1883) ; Mordwilko, Aphid. and Pemphigid, 285-298 (1896) ; Del Guercio, Prospetto d. Afid. italica. Nuove relaz. Se. I., 2, 103 (1900) ; Schouteden, Mém. Soc. Ent. Belg., XII., 202 (1906) ; Mordwilko, Biol. Zent. XXVII. 786-792 fig. 2 (1907) ; Mordwilko, Ann. Mus. Zool. d. Acad. Imp. d. Sc. St. Petersbourg, XIII., 369 (1908) ; Kneissl. Zeit. F. wissens. Insekten biol., V., 3. 82 (1909) ; Tullgren, Arkiv. f. Zool., 14, 186 (1909) ; Van d. Goot, Beit. z. Kennt. Holland. Blattläuse, 507 (1915) ; Tullgren,

Medd., No. 280, F. Central f. försök p. jordbrück Ent. Avdel., No. 44, 42 (1926); Theobald, Bull. Ent. Res., VI., 141 (1915); Willcocks, The Insect and Related Pests in Egypt, II., 104, 105, 119, 122 (1925); Hall, Tech. and Sc. Serv. Bull., 68, 2, (1926).

Apterous viviparous female (virgogenia). Various shades of brown, greenish brown to dark brown, a few nearly black, with or without transverse bars at base of segments, especially on the apical ones when present. Antennæ, legs, rostrum, cauda and anal plate deep brown. Head dark. Antennæ of six segments (in some found in July of five); segment i. a little longer than ii.; iii. longest; iv. and v. about equal; vi. as long as or a little longer than v., with a short blunt "nail"; some specimens show three to four sensoria on iv.; two on v. and one on vi.; others show none at all and in some specimens the number varies on the two antennæ; all the segments hairy. June forms show no sensoria. Rostrum reaches third coxæ. Abdomen with short dorsal and lateral hairs; apex with long ones.

Length 2 to 2.3 mm.

Found in the soil and crawling and being carried up *Cornus* bushes by ants in June; the latter were darker than those found in the ground and nymphæ occurred with them.

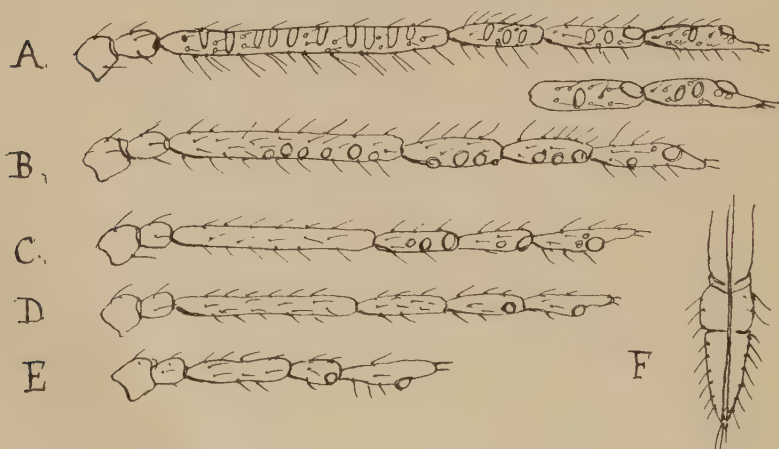


Fig. 39.—*Anoecia corni* Fabricius.

A. Alate ♀ antenna; (Sexupara); B. of virgogenea; C. and D. of apterous ♀; E. of oviparous ♀; F. apex of rostrum of apterous ♀.

Alate viviparous female (Sexupara). Velvety black ; first three abdominal segments pale yellowish white to ferruginous ; bases of last three apical segments pale. Antennæ dark ; segments i. and ii. about equal, now and then ii. the longer ; iii. longest, with ten to twelve laterally elongate sensoria, in some the first and last smallest ; iv. short, with three, rarely four sensoria ; v. very little longer, with two to three sensoria, one apical, the other or others on basal half ; vi. longer than v. ; " nail " about one-third length of base, with one to two sensoria, as well as the primary one (now and then vi. is no longer than v.) ; all the segments hairy. Eyes black. Rostrum darkened at apex, reaching to third coxæ. Legs deep brown to brownish-black ; base of femora paler, especially on fore and hind legs ; hairy. Cornicles scarcely projecting, bases broad.

Length 2.2 to 2.7 mm.

Found on Dogwood August to November, rarely in any numbers in August. A few have been found in June.

Alate viviparous female (Fundatrigenia ?) Head and thorax black. Abdomen much as in former female, but with four more prominent dark quadrangular lateral spots and the cornicles more elevated. Antennæ dark brown to black ; segments i. and ii. about equal ; iii. longest, with ten somewhat irregular sensoria ; iv. small, with three sensoria ; v. very little longer, with three sensoria basally ; vi. a little longer than v., by about length of the small blunt " nail " ; all segments hairy.

Length 2.5 mm.

Nymph. Found in soil and on *Cornus* in June. Very similar to the virgogenia in shape and colour. Wing pads brown. Antennæ of six segments, shorter than in apteræ and rather thicker ; i. and ii. nearly equal ; iii. longest ; iv., v. and vi. nearly equal, no sensoria except primary ones on v. and vi.

Oviparous female. Apterous, small, ovoid, somewhat translucent grey. Head and body with rows of longish hairs arising from small papillæ, a single row towards middle of each segment ; sometimes with small dark spots. Antennæ short, pallid, of five segments ; i. and ii. small ; ii. slightly shorter and narrower than i. ; iii. a little the longest ; iv. small, about size of ii. ; v. nearly as long as iii., somewhat swollen ; " nail " small and blunt. Eyes



Fig. 40.—*Anoezia corni* Fabricius.

a. Antenna of oviparous ♀; b. of ♂; C. apex of ♂ (c. after Tullgren).

small. Rostrum pale, apex dusky, reaches nearly to base of third coxæ or just beyond. Legs pallid, rather short and thick; tarsi dark.

Length 1 to 1.5 mm.; antennæ 0.4 mm. to 0.5 mm.

Male. Apterous; antennæ long and narrower than in oviparous female; segment i. large; ii. a little smaller; iii narrower than ii., about same length as v.; iv. about half of iii.; v. narrower than iii.; the "nail" about two-thirds of base; normal primary sensoria of iv. and v.; i. with two hairs; ii. with one; iii. with several; iv. with two and v. with two one side, one the other. Apex of body with a blunt penis, no claspers showing.

Length 0.7 mm.; antennæ .4 mm.

Variations in secondary sensoria of apterous female.

- a. From ants' nests, Great Salkeld, 13 vi. 10, and 23 ii. 10; Balrath, ix. 10. No sensoria.
- b. From ants' nests, with sensoria. Whitsand Bay, 9 vii. 11; Isle of Eigg, 17 ix. 11; Wye, 7 v 10.

One apterous ♀ shows no sensoria on iv. one side, one the other. Another showed none on v. on either side and another none on one side and the normal number on the other antenna.

ANTS' NESTS FOUND IN. *Formica rufa* and *F. fusca* (Donisthorpe); *Lasius niger* (Britten); *Lasius flavus* (Donisthorpe and Theobald); *Myrmica ruginodis* and *M. laevinodis* (Donisthorpe); *M. scabrinodis* (F.V.T.); Kneisel says "Often in numbers in ants' nests"; *Tetramorium caespitum* (Donisthorpe).

PLANT HOSTS. *Cornus sanguinea* ; roots of various grasses, wheat, oats, barley and rye ; roots of *Taraxacum*, *Senecio*, *Rumex*, *Carduus* and *Cratægus*.

LOCALITIES. Parkhurst, Isle of Wight, 8 ix. 12 ; Blackgang Chine, Isle of Wight, 26 viii. 13 ; (one alate ♀, apterous ♀♀ and larvæ in ants' nests (Donisthorpe)) ; Wye, 17 vii. and 8 ii. 09 on grass and wheat roots and 7 vi. 10 in ants' nests ; 3 ix. 12 ; 4 x. 11 ; 2 x. 04 ; 7 x. 12 on *Cornus* foliage ; Little Hadham, Herts, 27 ix. 13 in ants' nests and on *Cornus* ; Bath, 29 ix. 09 on *Cornus* with ants ; Hastings, 4 ix. 90 ; Exeter, vii. 10 with ants (F.V.T.) ; Wimbledon Common and Box Hill, Surrey ; Plympton, Devon ; Wanstead, Essex ; N. Berwick, Berwick ; Woking, Surrey (Laing) ; Great Salkeld, Penrith, 13 and 23, vi. 12 in ants' nests (Britten) ; Isle of Eigg, Hebrides, 19 xi. 11 ; 25 i. and 2 ix. 11 in ants' nests (one alate ♀ and many apteræ) ; Balrath, Co. Meath, Ireland, ix. 10 with ants ; on a small island in Tobermory Bay, Mull, Scotland, 15 ix. 11, in ants' nests ; Bradgate Park, 10. ix. 95 ; St. Issey, Cornwall, 25 iii. 10, with *T. caespitosum* (Donisthorpe) ; Wexford, Ireland, 6 x. 21 in ants' nests, overwintering ♀ (Donisthorpe) ; and 16 ix. 21, nymphæ in ants' nest (A.H.S.), these specimens were sent me by Mr. F. Laing ; Harpenden (Davidson) ; Rothamsted (Rymer-Roberts) ; Oxford, 12 x. 12 (F.V.T.). Germany (Kaltenbach, etc.) ; Montpelier, France ; Switzerland ; Ohio, U.S.A. (B.M. Collection) ; Russia (Mordwilko) ; Sweden (Tullgren) ; Holland (V. d. Goot) ; Japan (Okajima, Takahashi) ; New Haven, Connecticut, U.S.A. (Wilson).

Observations. The greater part of the life of this common Aphid seems to be passed in the soil, where it feeds upon the roots of various plants, notably *Gramineæ* and it occasions no inconsiderable loss to cereal crops in parts of Continental Europe, especially Russia. Recently it has been brought to my notice on the roots of wheat in England and it was clearly doing no little damage. It is very frequent in ants' nests and it is certainly closely connected with them, for we not only find it on the roots of plants growing in the ants' nests, but we may observe the ants carrying them to their formicaries, both the alatæ and apteræ. It is said that the ants also tend the ova, but I fancy this applies to the following species as the oviparous form of *pskovica* of Mordwilko occurs in the soil, whilst the ova of *corni* are laid by the

female on *Cornus*. The sexuparæ or alate viviparous females of the autumn are best known, for they often occur in vast numbers on the leaves and top shoots of the Dogwood (*Cornus sanguinea*). These alatae I have found in dense masses at one time, at others scattered about. Most occur under the leaves from late August to November. The majority in October, but now and then very many in mid-September. The latest date I have found them was on November 12th. One may find these alatae on almost any plant as stray specimens, but it is only on *Cornus* that I have seen them cluster and produce their young (Fig. 41). Kaltenbach speaks of them as occurring in the air at the end of August and September



Fig. 41.—*Anoezia corni* Fabricius.
Larva.

in such masses as to become a pest to people by getting into their eyes, nose and ears, and mentions that on one occasion a swarm kept passing through the town all one afternoon. They may drop their young anywhere in flight. The colonies of sexuparæ are largely attended by ants. Both Donisthorpe and myself have on several occasions observed ants carrying alatae to their nests and I have seen them carrying the young lice to the soil in autumn, but whether they develop there is not known, but so far the typical oviparous *corni* with antennæ of five segments have not been found in ants' nests. The oviparous females found with antennæ of six segments evidently being Mordwilko's *pskovica*.

Various sized virgogenia may be found in the soil at the same time. In June, 1914, and again in May, 1915, I found large

colonies of *Anæcia* on Dogwood, largely attended by *Lasius niger* and *L. flavus*. Unless these are a distinct species we get fundatrigenia also produced in summer. This is what Kaltenbach tells us, for he describes it as occurring in the flower heads of the Red Dogwood and on the upper leaves and leaf stalks in May and June. This is not of common occurrence here, for it is a very common species at Wye and can always be found in swarms in the autumn, but I have only seen it twice in May and June above ground.* At the time I observed the first of these summer colonies I found crowds of virgogenia in the soil at the roots of wheat and many other plants and in ants' nests and some of the latter collected gave rise to the alate brood in August and continued to do so in the laboratory until October 15th. Donisthorpe found one alate female being carried by *Myrmica scabrinodis* to its nest in Blackgang Chine, Isle of Wight, on August 26th, 1913, so that its appearance may date from August to October as the second alate generation. Kaltenbach refers to the last brood or spawn, that is the progeny of the sexuparæ as passing the winter under fallen leaves and that they are told by the peculiar colouring, they are whitish with brown spots on the body. This is not what happens in Kent, for the young kept under observation became sexuales, as has also been found by Mr. Rymer Roberts. The small males die after fertilising the females, which soon deposit their eggs. From what I have observed, the stages overlap, but most of the life is spent in the ground. Mordwilko suggests that the aphides originally occurred both on trees and grasses and subsequently split up into more specialised forms, some of which became exclusively associated with one kind of plant, the others becoming migratory (Revue Russe, d. Ent. XV. 75-79, 1916). In this I quite agree and there is no doubt that *A. corni* has a more or less permanent ground form and that aerial migration to *Cornus* also takes place. A single nymph found by Donisthorpe in an ant's nest on the Isle of Eigg in the Hebrides in September exactly agreed with nymphæ I found in

* I have observed this species for some years on Wimbledon Common and I find that nymphæ are to be found on the Dogwood early in May and alatæ regularly by the end of May. In the abnormally wet summer of 1927 the earliest date the alatæ were observed was the 22nd May; a few alatæ were on the wing, and many nymphæ were on the stalks; a week later, the 29th, practically all had changed to alatæ and by 10th June, not a single specimen, alate or apterous, could be found (F. Laing).

June on the Dogwood in Kent, but was paler in colour. I am inclined to think that the vagaries of this species can be accounted for by the fact that some have become entirely subterranean, whilst others retain their migratory habits. It is possible that there has been some confusion between two species, namely, *corni* and *pskovica*, which latter Mordwilko found on the roots of grasses in Russia at Pskov; the sexual forms breeding on the roots of grasses and the ova wintering there.

Mordwilko speaks of his species as being entirely root frequenting. There is no difference between the alate *corni* in Great Britain when hatched from the soil or on the Dogwood in May and June. Some oviparous females sent me by Mr. Donisthorpe have antennæ of six segments and are thus *pskovica*; the oviparæ of *corni* having only five segments to the antennæ.

Hall (Notes on the Aphididæ of Egypt, Tech. and Sc. Service, Bull. 68, Min. Agri., Egypt, p.1. 1926) considers my *Anæcia willcocksii* to be the same as *corni*. On going over all my material I am inclined to agree with him as I find much variation in the sensoria both in recently received Egyptian material and in European specimens. Mordwilko on the other hand considers it distinct.

In Egypt it sometimes occurs on wheat roots in large numbers and Willcocks also records it on barley.

ANOECIA PSKOVICA Mordwilko.

Rev. Russe, Entomo. XV., 76 (1916).

Oviparous female. Apterous. Antennæ of six segments; i. slightly shorter and broader than ii.; iii. narrower and longer than i. + ii.; iv. much shorter than iii.; v. a little longer than iv.; vi. slightly swollen and darker, nearly as long as v., with short blunt "nail"; a primary sensorium at apex of v. and one at base of "nail"; all the segments hairy. Rostrum rather short, reaches just past second coxæ. Apical segment small and dark, with a prominent bristle each side at base. Body hairy and containing two to three black ova. Legs dark brown, rather thick, hairy, hairs arising from small pale spots.

Length 1.8 to 2 mm.

LOCALITIES. Hartlepool, 10 x. 10; Whitsand Bay, Cornwall, 9 vii. 11 (Donisthorpe); Wye 7 x. 14 (F.V.T.). All in ants' nests.



Fig. 42.—*Anoecia pskovica* Mordwilko.
Apterous oviparous ♀.

Observations. These were recorded by me as the oviparous females of *A. corni*. They differ in having antennæ of six segments and the larger size. I have so far not found the other stages of this species.

Sub-tribe TRAMINA.

Marked and specialised Aphides in which the second hind tarsal segment is much elongated. The apteræ are all subterranean. What happens to the alatae we do not know. The apteræ feed upon the roots of plants and have been found to do some harm to tubers, such as artichokes. They are frequently associated with ants. The abnormal hind tarsi have the basal segment much reduced, whilst the second is very long, from two-thirds to three-quarters length of the tibiæ. Rostrum long, at least half length of body, often as long or even longer in immature forms. Antennæ of six segments, usually about half length of body; segment iii. longest, in some species about equal to iv. + v.; flagellum reduced to a small "nail"; sensoria on iii., iv. and v., large primary ones on v. and vi. in alatae; all segments hairy. Eyes variable, from well-formed projecting structures to minute few facettled bodies. Cornicles variable, some (*Protrama*) with large cone-shaped ones, similar to the *Lachnids*, others small,

almost level with the body surface (*Neotrama*), others appear to be devoid of them (*Trama*); those which are cone-like are hairy. Alate viviparæ with marked venation (vide fig. 44) Sexuales unknown. Antennæ, body and legs of apteræ hairy. Anal plate rounded. Cauda rounded or projecting as a blunt structure. Alatæ are very seldom seen. Walker says "it occasionally but very rarely acquires wings." Del Guercio, Schouteden and Tullgren have described alatae and I have found a few on artichokes in my garden. The habits of these soil aphides are peculiar. Buckton, in his monograph says, "The hind legs are often vibrated and occasionally they are jerked upwards in the manner affected by several of the Lachninae." According to Crawley and Donisthorpe, the *Trama* salutes the ants with its hind legs, when solicited. I have often in breeding cage experiments made *Trama troglodytes* do this by placing a pencil point or paint brush near to them. The actual stimulus does not seem necessary to make them perform their antics. When unearthed, Buckton says "they are generally a pale semi-transparent hue, but on exposure the antennæ and legs become brown." I have not noticed this, those I have dug up have shown no marked change in colour and if left alone would soon return to the roots. Writing from Merton, Surrey, Mr. Cape, of the John Innes Horticultural Institute, says that this aphid (*troglydytes*) was common in the summer of 1912 on the roots of *Doronicum plantagineum*, the Leopard's Bane, but in January it was scarce, and that whilst ants attended them abundantly in the summer, none were found with them in winter. They later went deeper in the soil, deeper even than *Doronicum* roots. The individual species vary much in colour, even in the same colony.

The Auricula pest described by Murray as *Trama auriculæ* is not a *Trama*, but comes in the genus *Pemphigus*. Nor does Thomas' *Trama erigeronensis* (Eighth Report St. Ent. Ill., p. 168 and Forbes and Hart, Eighteenth Rept. St. Ent. Ill., p. 98, 1894) belong to the genus *Trama*.

Three genera occur in this Sub-tribe and they tabulate as follows:—

1. Apterous form entirely without cornicles and with rudimentary eyes *Trama*.
- Apterous form with cornicles.

2. Apterous form with large broad *Lachnus* like cornicles and large distinct compound eyes *Protrama*

Apterous form with small cone-like cornicles armed with a few hairs and more or less rudimentary eyes *Neotrama*

The characters of these genera are given as follows :

1. Genus *Protrama* Baker

Head divided, front straight, eyes prominent and set off from the head. Antennæ of six segments, armed with hairs and small sub-circular protruding sensoria. Cornicles situated on broad, low, hairy cones. Cauda and anal plate rounded. Hind tarsi extremely elongate. Wing venation faint, fore wings with the media twice branched ; hind wings with both media and cubitus present.

Type *Trama radialis* Kalt.

2. Genus *Trama* Heyden.

Head divided, but not prominently so ; front straight. Apterous form with the eyes reduced to a few facets. Antennæ of six segments. Cornicles absent. Cauda sub-conical, rounded. Anal plate rounded. Entire insect minutely hairy. Type *Trama troglodytes* Heyden.

3. Genus *Neotrama* Baker.

Head somewhat flat. In apteræ the eyes reduced. Antennæ of six segments. Cornicles on very small cones, with a few scattered hairs. Cauda sub-conical, rounded. Anal plate rounded. Entire body covered with fine hairs. Hind tarsi greatly elongated. Type *troglydites* of Del Guercio (—*Neotrama delguercioi* Baker).

Four species occur in Great Britain :

- (1) *Trama troglodytes* Heyden.
- (2) *Protrama radialis* Kaltenbach.
- (3) *Protrama donisthorpei* Theobald.
- (4) *Neotrama formicella* sp. nov.

The apteræ tabulate as follows :—

1. No cornicles visible.

Eyes minute

troglydites.

2. Cornicles present.

Eyes large.

Cornicles large, on elevated cones.

Antennæ with few sensoria on iii.

*radicis.*Cornicles as above ; many sensoria on iii. *donisthorpei.*

aa. Eyes moderate.

Cornicles small and flat

formicella.

Genus TRAMA Heyden.

Rhizobius Westwood.

Heyden, Mus. Senk., II., 293 (1837) ; Kaltenbach, Mono. Pflanz., 211 (1843) ; Amyot, Ann. Soc. Ent. Fr., 2 V. 487, 542 (1843) ; Westwood, Ann. and Mag. N.H., XIV., 453 (1844) ; Westwood, Proc. Ent. Soc., 1841-1846, p. 85 and Trans. Ent. Soc., IV., 1845-1847, Proc., p. 71 ; Walker, List. Homop., IV., 106 (1852) ; Koch, Die Pflanz., 306 (1857) ; Passerini, Aphid. Ital., 61 (1863) ; Buckton, Mono. Brit. Aph., III., 68 (1881) ; Mordwilko, Zool. Ang., XVIII., 74 (1895) ; Del Guercio, Pros. dell. afido. ital. Nuove. relaz., II., (1900) ; Schouteden, Mém. Soc. Ent. Belg., XII., 208 (1906) ; Del Guercio, Redia, VI., 238 (1908) ; V. d. Goot, Beit. z. Kennt. Holl. Blätt., 511 (1915) ; Baker, Bull., 826, U.S. Dept. Agri., 19 (1920) ; Tullgren, Aphid. Stud., II., 58 (1925).

TRAMA TROGLODYTES Heyden.

Trama radicis Koch (non Kalt.).*Trama pubescens* Koch.*Rhizobius helianthemii* Westwood.*Aphis radicum* Goureau ?

Heyden, Mus. Senk., II., 293 (1837) ; Koch, Die Pflanz., 307, 308, pp. 375, 377 (1854) ; Westwood, Ann. and Mag. Nat. Hist., XIV., 453 (1844) ; Walker, List. Homop., B.M., IV., 1061 (a.p.), (1852) ; Goureau, Bull. Soc. Sci. Hist. Nat., Yonne, 2, 259 (1861) ; Passerini, Aphid., Ital. 61 (1863) ; Buckton, Mono. Brit. Aphid., III., 68, Pl. cii., figs. 5 to 7 (1881) ; Del Guercio, Nuove Relaz. II., 107 (1900) ; Schouteden, Mém. Soc. Ent. Belg. XII., 208 (1906) ; Victoria Hist., Cornwall, 245 (1906) ; Donisthorpe, Ent. Rec. 6 (1907) ; Crawley, Ent. Rec. 24 (sub-*Paracletus*) (1911) ; Donisthorpe, Ent. Rec., 39 (1912) and 268 (1913) ; Theobald, Ent. Rec., 48 (1913) ; Van d. Goot, Beit. z. Kennt. Holland Blattläuse 512 (1915) ; Tullgren, Aphid. Stud., II., 60, fig. 34-37 (1925).

Apterous viviparous female. Body oval to elongate oval, domed and segmented, to some extent carinated, hairy, hairs moderately long, but faint. Colour varies from pale yellowish-white to pearly white or dull brownish-green, sometimes semi-transparent. Antennæ all or partially brown, last segment frequently darkest, usually less than half of the length of the body ; of six segments ; i. broader than ii., which is enlarged and rounded apically and constricted at the base ; iii. longest, equal to iv. + v., or slightly shorter ; iv. less than half iii., and much shorter than v. ; v. longer than vi. ; the latter with very short, blunt " nail " and large sensorium at its base ; all segments hairy. Head flat to slightly curved in front ; hairy. Eyes very small and dark

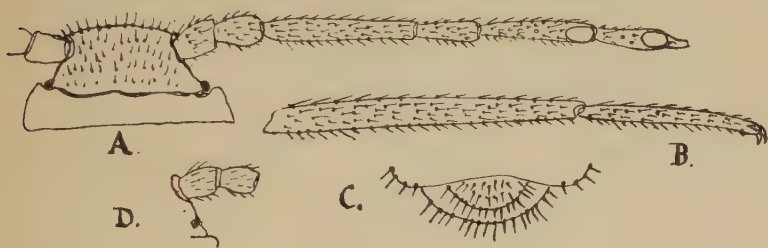


Fig. 43.—*Trama troglodytes* Heyden.

A. Head and antenna of apterous ♀ ; B. Hind tibia and tarsus ; C. Apex of body ; D. Base of antenna.

of a few facets only. Rostrum long, from one-half to two-thirds length of body, longer in early stages, often projecting beyond tip of body, hairy. Legs brown, long, especially hind pair ; fore and mid tarsi normal ; posterior tarsi with second segment very long, more than half the length of the tibia ; segment i. minute and partially hidden, hairy. Cauda and anal plate rounded, hairy.

Length 2.5 to 3.5 mm.

Alate viviparous female. Head and thorax broad. Abdomen small. Antennæ of six segments, not much longer than head and thorax. Segment i. broader than ii. and a little longer ; iii. longest, or not much shorter than vi., with five to six round sensoria of various sizes ; iv. less than half of iii., with two to three round sensoria ; v. a little shorter than vi., with a large ovoid apical sensorium ; vi. with a single large sensorium at the base of

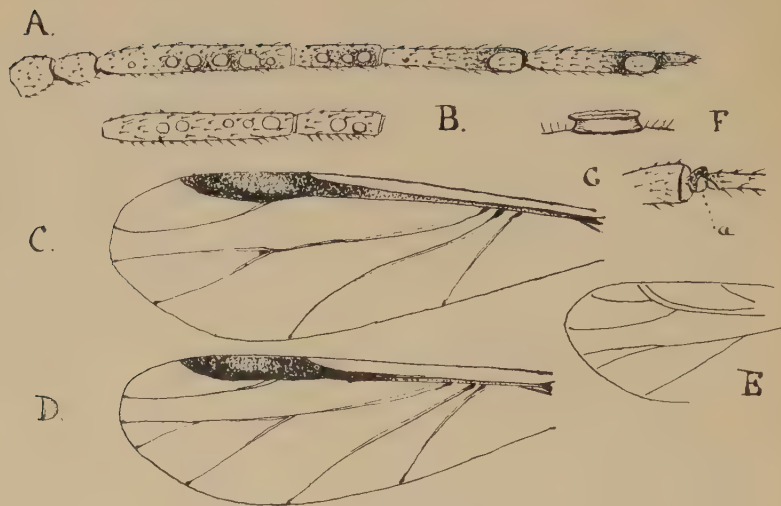


Fig. 44.—*Trama troglodytes* Heyden.

A. Antenna of alate ♀; B. Segments iii. and iv.; C. and D. and E. Fore Wings; F. Cornicle; G. Junction of femur and tibia (a) connecting membrane.

the short "nail." Cornicles slightly raised, lips expanded. Wings as shown in figure 44.

Length 2.7 to 3 mm.

FOOD PLANTS. *Leontodon taraxacum*; *Lactuca*; *Cnicus arvensis*; *Sonchus oleraceus*; *Hieraceum pilosella*; *Crepis biennis*; *Artemisia vulgaris* (Buckton); *Carduus* sp.; *Doronicum* sp.; *Cynara* (Theobald); *Cichorium intybum*; *C. andivia*; *Achillea millefolium*; *Silybum marianum* (Schouteden).

LOCALITIES. Beckenham (Lubbock); Grampian Hills (Hardy); Berwickshire (Buckton); St. Issey, Cornwall, 25 v. 11; with *Lasius flavus*; Bradgate Park, Leicestershire (Donisthorpe); Merton, Surrey (Williams); Oxshott, Surrey; Wye; King's Wood, near Ashford, Kent; Tonbridge; Reading; Worthing; Great Staughton, Hunts., Worcester (F.V.T.); Rothamsted, 3 viii. 17 (Davidson); Porlock, with *Lasius niger* (Crawley); Sandown, Isle of Wight, with *L. niger*, 1 viii. 14; Oxford (Crawley); Merton, Surrey; Freckenham, Suffolk; Chelsea, London (B.M. Coll.); Salkeld Dykes, Penrith (Britten); Cambridge (Davidson); Harpenden, 20 x. 26 (Davidson); Frankfurt, Germany (Heyden); Germany (Koch); Italy (Passerini); Belgium (Schouteden).

Observations. This Aphid has been much confused with *T. radialis* of Kaltenbach. It can at once be told by the absence of visible cornicles and the very small rudimentary eyes. The antennal segments of the apteræ agree, however, with Kaltenbach's figure and description of *radialis*. In all the *Tramas* with no cornicles and rudimentary eyes I find that the fifth antennal segment is longer than the sixth, as is described for *radialis*, but the latter has large eyes and Lachnus-like cornicles. It appears to be our commonest Trama. It is largely associated with ants and has been found by Donisthorpe and others in the nests of *Lasius flavus*; *L. niger*; *Myrmica scabrinoides* and *Formica rufa*. I have found the apteræ at all times of the year on the roots of plants. Buckton records it up to late in November, Williams in January, Britten in March and Donisthorpe in ants' nests from May to October. It is often harmful to the tubers of the artichokes and often swarms in great masses on them. Boiduval (Essai sur L'Entomologie Horticole, 279, 1867) records it as destructive to plants.

Genus PROTRAMA Baker.

Bull. 826. U.S. Dep. Agri., 19, Pl. III, figs. P-T (1920).

Very similar to *Trama* but with pronounced Lachnus-like cornicles and large prominent eyes. Head straight in front and with a marked median suture. Antennæ of six segments, hairy, with a few round sensoria and large oval ones on segments v. and vi. of the apterous females and protruding ones in the alatæ. Cauda and anal plate rounded and hairy. The conical cornicles have hairs on the sides. Legs hairy; hind tarsals much elongated. According to Baker the alate female has the wing venation faint as in *Trama* and the fore wings with the media twice branched; hind wings with both media and cubitus present.

The type of the genus is *Trama radialis* of Kaltenbach.

PROTRAMA RADICIS Kaltenbach.

Trama radialis Kaltenbach.

Trama flavescens Koch.

Trama troglodytes Schlechtendal, etc.

Trama ranunculi Del Guercio.

Kaltenbach, Mono. Pflanz., 211 (1843); Koch, Die Pflanz., Aphid., 307, fig. 376 (1857); Del Guercio, Nuove relaz., II., 107

(1900) ; Schlechtendal, D. allg. Zeitich. f. Entomo., VI., 245-255, fig. 1-15 (1901) ; Mordwilko, Zur. Biol. u. Morph. d. Pflanz., 279, fig. 34 ; Horæ. Soc. Ent. Russ. Bd., 31 (1901) ; Schouteden, Mém. d. l. Soc. Ent. Belg. XII, 208 (1906) ; Mordwilko, A. K. Ann. d. Mus. Zool. Acad. Imp. Sci. d. St. Petersburg, 373, XIII. (1908) ; Del Guercio, Nuove. Relaz. d. R. Staz. Ent. Agri. d. Firenze, I., 195-206 and Redia V., 244, Pl. ix., figs. 1-5 (1909) ; and 248 (a.p.) = *ranunculi* ; Tullgren, Aphid. Stud. II., 66, figs. 40, 41 (1925).

Apterous viviparous female. Very like *troglodytes*, but with much larger eyes and prominent cornicles. Colour varies from pearly white, pale yellow to green and brown. Antennæ brown, shorter than body, of six segments ; i. larger than ii., the latter somewhat inflated apically ; iii. longest, a little longer than v. and vi. ; iv. about half iii. to rather less, with two to three small round sensoria ; v. about as long as vi. ; former with a large roundish apical sensorium and vi. with one of a similar size at base of the short blunt " nail " ; all the segments with simple short hairs. Head flat, with a median division and hairy.

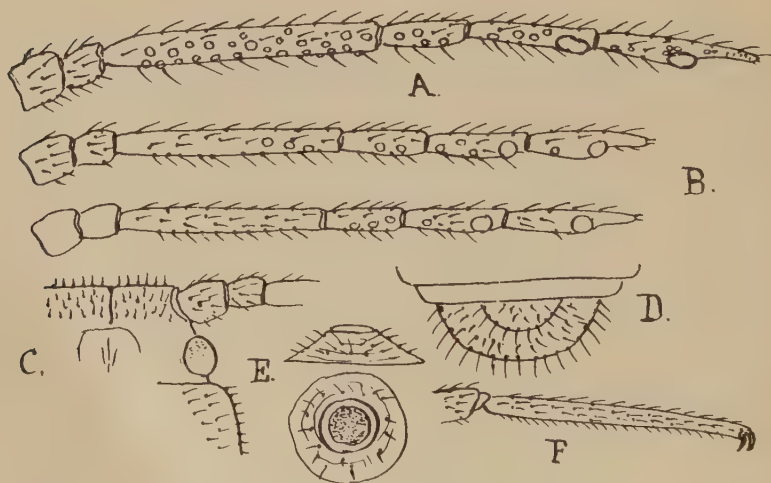


Fig. 45.—*Protrama radicis* Kaltenbach.

A. Antenna of alate ♀ ; B. Two varieties of apterous ♀ ; C. Head ; D. Apex of body ; E. Cornicles ; F. Hind Tarsus.

Eyes large and prominent. Body hairy. Anal plate and cauda both rounded and hairy. Cornicles prominent, on broad flattened cones, very similar to *Lachnus*, with scattered hairs. Legs brown, rather long, especially the hind pair; second hind tarsal very long, but not quite so long as tibia; basal segment minute; legs hairy.

Length 2.8 to 3 mm.

Alate viviparous female. Head broad; antennæ rather more than half the length of body, of six segments; iii. longest, rather more than one-third of iv.; v. slightly longer than iv.; vi. still longer; iii. with 32 sensoria; iv. with 8, one being large; v. with 4, besides the large primary one; vi. has a few small ones below the large primary; hairy. Rostrum long and thin. Pronotum distinct. Abdomen rather small, about size of head and thorax. Cornicles small and conical. Wings ample; first long vein thrice forked; second, twice forked; three and four, simple. Hind tarsal about half as long as tibia.

FOOD PLANTS. Artichokes and various grasses (F.V.T.) *Artemisia* sp.; *Ranunculus repens*; various *Compositæ* (Schouteden). Lettuce (Davidson). ANTS NESTS FOUND IN, *Lasius niger*; *L. flavus*; *L. alienus*; and *Formica fusca* (Donisthorpe); *Lasius flavus* (Crawley).

LOCALITIES. Wye, 20 i. II (F.V.T.); Mersham, Yorks (Crawley); Dartmouth, iv. 08; St. Issey, Cornwall, 25 iv. II; Sandown, Isle of Wight, 8 x. 09; vii. 09; Islip, 13 v. 10; Bradgate Park, 3 v. 09; Rossbeigh, Co. Kerry, vi. 02; Lundy Island, 9 vi. 13 (Donisthorpe); Porlock, Somerset, 18 iv. 15 (Crawley); Harpenden, 30 viii. 24 (Davidson); Potters, Wilts.; Southgate; Haverstock Hill; Dover; in grounds of Nat. Hist. Mus., S. Kensington (B.M. Collection); Germany (Kaltenbach); Belgium (Schouteden); Russia (Mordwilko).

Observations. This insect has been confused with *Trama troglodytes*. It can at once be distinguished by the presence of cornicles, which approach those of some Lachnids and by the presence of large eyes, whilst in *troglodytes* they are very small. This species does not appear to be common and lives on the roots of plants alongside of the true *troglodytes*. It occurs also in ants' nests.

Variations in colour. The following varieties were noticed in a colony feeding on *Doronicum* roots, attended by a *Lasius* :—

1. Adult apterous female. Head and thorax brown. Body pearly white, with small dark lateral spots. Antennæ dark brown; fore and mid legs rich brown, apices of segments dark; hind legs pale, except coxæ, base of femora and apex of tarsi. Rostrum brown, reaching to two-thirds length of body.

Form 2. Dark greenish-brown, with traces of dark lateral specks on abdomen; base and apex of antennæ darkened; legs darker than form 1.

Form 3. Pale yellowish-white; last three antennal segments brown; fore and mid tarsi and apices of tibiae very dark brown; apex of hind tarsals may be dusky and in one a dark spot at apex of hind tibia. Rostrum pale brown, apex dark. Eyes black.

PROTRAMA DONISTHORPEI Theobald.

Trama donisthorpei Theobald.

Theobald, Ent. Rec., XXVII, 3, 52 (1915).

Apterous viviparous female. Head, thorax, antennæ and legs dark. Abdomen paler, with dark lateral spots and dusky cross

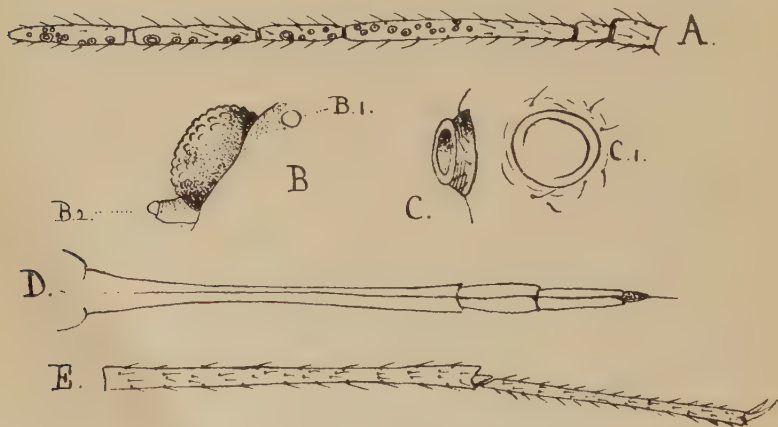


Fig. 46.—*Trama donisthorpei* Theobald.

Apterous ♀. A. antenna; B. Eye; B.1. Stemmata; C. and C.1. Lateral and dorsal view of cornicle; D. Rostrum; E. Hind tibia and tarsus.

bars, broken posteriorly by a median pale line. Antennæ of six segments ; i. and ii. nearly equal in length ; i. widest ; iii. longest, about as long as iv. + v. ; iv. shorter than v. ; v. and vi equal ; iii. has twelve sensoria on apical two-thirds ; iv. has five to six ; v. with 3 + i. ; vi. with three basally, then a group of three smaller ones and then two close to the large primary sensorium. Eyes large and black. Head hairy, with a marked median suture. Thoracic segments very distinct, especially the pronotum. Cauda short and rounded, with rather long hairs. Cornicles elevated, with large circular opening. Rostrum long, reaching well beyond third coxæ, apex dark. Hind tarsus much more than half hind tibia ; hairy ; scantier hairs on tibiæ ; posterior trochanters large. Eyes with distinct ocular process.

Length 3 mm.

LOCALITY. Blackgang Chine, Isle of Wight, 2 viii. 13 (Donisthorpe).

Observations. Found in an ant's nest (*Tetramorium cæspitum*). It is described from a single specimen and differs from *radicis* in the greater number of antennal sensoria and in the larger ocular process. Although the cornicles are not quite so outstanding I think it is best placed in this genus.

Sub-genus NEOTRAMA Baker.

Bull., 826, U.S. Dept. Agri. 20, Pl. iii., M.O. (1920).

Related to *Trama* and *Protrama* and seems to be an intermediate form. The head is somewhat flattened with a median short suture. In the apteræ the eyes are reduced, being intermediate between the small eyes of *Trama* and the large ones of *Protrama*. Antennæ normal, of six segments, with a few round sensoria in the apteræ as well as large oval ones on segments v. and vi. Cornicles on small flat cones, with a few scattered hairs, the same as those on body. Cauda sub-conical and to some extent the anal plate (Baker says of the latter rounded). Hind tarsi as in former genus.

Baker fixed the type as *Trama troglodytes* (Del Guercio), which he renamed *Neotrama delguercioi*. The species I describe here is certainly not Del Guercio's *troglodytes*, so I record it as new.

NEOTRAMA FORMICELLA sp. nov.

Apterous viviparous female. Very similar in general appearance to *Protrama radialis*, but the eyes are much smaller and the cornicles much flatter. Head rather convex in front, hairy, with median suture. Antennal segment i. broader and if anything shorter than ii.; iii. longest; iv. about half of iii., with one small sensorium near apex; v. not quite so long as iii., with very large

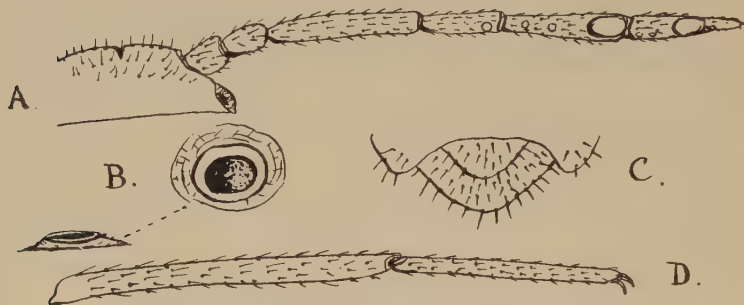


Fig. 47.—*Neotrama formicella* sp. nov.

Apterous ♀. A. Head and antenna; B. Cornicle; C. Apex of body; D. Hind tibia and tarsus.

oval primary sensorium and two small ones; iv. shorter than v. with a large oval sensorium at base of the short, blunt nail; all the segments with many short, pale hairs. Cauda and anal plate somewhat conical, hairy. Second hind tarsal long, about three-quarters of tibia; legs hairy.

Length 2.9 mm.

LOCALITY. Islip, 13 v. 10 (Donisthorpe).

Observations. Found on the roots of plants in an ants' nest (*Lasius niger*). Described from a single specimen.

Sub-tribe PTEROCHLORINA.

The stigma is elongate in this sub-tribe and the radial sector of the fore wings is rather curved and not close to the tip of the wings. Antennæ of six segments, with distinct hairs and sub-circular sensoria. Cornicles large, on broad hairy cones. Males usually alate.

Two genera occur in Great Britain, *Pterochlorus* and *Stomaphis*; another genus occurs in America, *Longistigmus*. These genera tabulate as below :—

1. Stigma extending along costal margin to tip of wing.
Longistigmus.
2. Stigma not so extending.
Rostrum very long, much longer than body ; antennal hairs fine. *Stomaphis*.
Rostrum normal ; antennal hairs short. *Pterochlorus*.

BRITISH SPECIES OF *Pterochlorina*.

1. *Pterochlorus saligna* Gmelin.
2. *Pterochlorus longipes* Dufour.
3. *Pterochlorus roboris* Linnæus.
4. *Pterochlorus rosæ* Cholodkovsky.
5. *Stomaphis quercus* Linnæus.
6. *Stomaphis longirostris* Fabricius.

Genus PTEROCHLORUS Rondani.*

- Dryaphis* Koch.
Tuberolachnus Mordwilko.
Dryaphis Del Guercio.
Schizodryobius Van der Goot.
Pterochloroides Archangelsky.
Tuberodryobius Das.
Maculolachnus Gaumont.

Rondani, Nuovi. Ann. Scienze Naturali, 35 (1848) ; Koch, Die Pflanz., 225 (1855) ; Macchiati, Aphid., Calabria, 263 ; Mordwilko, Ann. Mus. Zool. Acad. Imp. d. Sci., St. Petersburg, XIII., 374 (1908) ; Del Guercio, Redia V. 262 (1908) ; Van der Goot, Tijd. v. Ent., 56, 130 (1913) ; Archangelsky, Turkestan, Ent. Sta. Rept. Tashkent (1917) ; Das, Mem. Ind. Mus., VI., 259 (1918) ; Baker, Bull. 826, U.S. Dept. Agri., 18 (1920) ; Van der Goot, Beit. z. Kennt. d. Holl. Blattläuse, 411 (1915) ; Gaumont, Bull. Soc. Ent. Fr., 26, 31 (1920).

* As Burmeister's *punctatus* is the same as Boyer's *viminalis*, *Lachnus*, Burmeister has priority over the name *Pterochlorus*. In the same year Curtis created the genus *Cinara*, which may take the place of both ; vide Appendix.

Antennæ of six segments, with prominent hairs and sub-circular sensoria. Head rounded. Cauda and anal plate rounded. Abdomen may have a large dorsal tubercle (*saligna*). Cornicles prominent, on hairy cones. Wings often banded or mottled. Radial sector distinctly curved; media twice branched; media and cubitus present in hind wings. The genus *Tuberolachnus* was separated on account of the dorsal abdominal tubercle seen in *saligna*, but this cannot be taken as a generic character. The genus *Pterochloroides* and *Tuberodryobius* were founded on *persicæ* (Cholodkovsky), which in spite of the fact that it has several dorsal tubercles seems to be so close to the generic type of *Pterochlorus* (*roboris*) that it is not accepted here.

Four species occur in Great Britain: (1) *saligna* Gmelin; (2) *roboris* Fabricius; (3) *longipes* Dufour; and (4) *rosæ* Cholodkovsky.

PTEROCHLORUS SALIGNA Gmelin.

Aphis viminalis Boyer.

Aphis saligna Gmelin.

Aphis salicis Sulzer:

Aphis punctatus Burmeister.

Aphis salicis Curtis.

Aphis saligna Walker.

Aphis salicina Zetterstedt?

Lachnus viminalis Passerini.

Lachnus dentatus Le Baron.

Lachnus fuliginosus Buckton.

Tuberolachnus viminalis Mordwilko.

Gmelin, Syst. Nat., 2209, No. 62 (1788); Boyer, Ann. Soc. Ent. Fr., X., 184 (1841); Sulzer, Abg. Gesch. d. Ins., 105 (1776); Curtis, Trans. Linn. Soc., VI., 75, pl. v., figs. 1 and 2 (1800); Burmeister, Handbk. d. Ent., II., 93 (1835); Zetterstedt, Ins. Lapp., I., 311 (1840); Walker, List. Homop. (B.M.), Pt. IV., 959 (1852); Passerini, Aphid. Ital., 64 (1863); Ferrari, Aphid. Liguriæ, 80 (1872); Buckton, Mono. Brit. Aphid., III., 52, pl. xcix. (1880); Muller, Eastbourne, Nat. Hist. Soc., 1-6 (1881); Buckton, Ind. Mus. Notes, II., 40, figs. two, p. 40 (1891); Theobald, First Rept. Eco. Zool. (B.M.), 116 (1903); Journ. S.E.A. Coll., No. 14 126-132, fig. 36 (1905); Schouteden, Mém. Soc. Ent. Belg., XII., 207 (1906); Del Guercio, Redia V., T. xiii., figs. 117-124 (1908);

Mordwilko, Ann. Mus. Zool. Acad. Imp. Sci., XIII., 374 (1908); Theobald, Rept. Eco. Zool. for 1912, 96-98 (1913); Bull. Ent. Res., VI., 144 (1915); Das, Mem. Ind. Mus., VI., 4, 257 (1918); Swain, Ent. News. Phil., XXXI., 211 (1921); Willcocks, Sult. Agri. Soc., Bull. I., 300 (1922); Hall, Aphid. Egypt. Min. Agri. Tec. and Sc. Service Bull., 68, 4 (1926); Okamoto and Takahashi, Ins., Matsumurana, I., 3, 145 (1927); Takahashi, Proc. N.H. Soc. Fukien Christ. Univ., I., June (1928).

Alate viviparous female. Dark brown, greyish-brown to deep ochreous-brown; body with rows of transverse black spots and a dark dorsal mark. Thorax dark brown. Head, legs and antennæ of similar colour to body, but base of femora and tibiæ

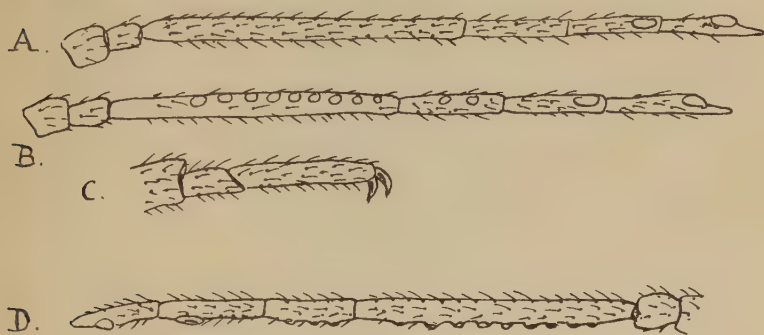


Fig. 48.—*Pterochlorus saligna* Gmelin.

A. Apterous ♀ antenna; B. Alate ♀ antenna; C. Hind tarsus; D. Side view of B.

paler, a deep ochreous-red; coxæ black. Insertions of wings paler, an orange-yellow colour; stigma a deep brown; the veins are a pale brown. Cornicles dark. Antennæ, legs and body hairy; hairs fine. Antennæ shorter than the thorax; segment i. wider but no longer than ii.; iii. nearly as long as iv. + v. + vi., with 9 to 10 sensoria along one side, in most views projecting; iv. not quite so long to slightly longer than v., with 2 to 3 sensoria as on iii.; v. with a large apical projecting sensorium; vi. as long as v., or a little shorter; a large sensorium at the base of the short, blunt, nail. Rostrum dark, reaching to or past the third coxæ. Legs, especially the hind pair long. Cornicles large and cone shaped.

Length 4.5 to 4.8 mm.; wing expanse 15.1 to 15.6 mm.

Apterous viviparous female. Globose; dark sienna brown to dark ochreous-brown, with a dense coat of fine, shiny grey hair. Head small; flat in front. Antennæ much the same colour as body, but dark reddish brown at base and darker at apex, with fine hairs. Legs same colour as body, base of femora reddish. Dorsum of abdomen with rows of small transverse black spots and a large characteristic black horn-like process. Legs long, especially hind pair; hairy. Cornicles dark and large, cone shaped. Antennæ narrow, short, not so long as the thorax; i. wider but no longer than ii.; both dark; iii. longest, a little longer than iv. + v. + vi.; all of which are about equal; a large prominent sensorium on



Fig. 49.—*Pterochlorus saligna* Gmelin.
Apterous viviparous ♀. Showing dorsal process.

apex of vi. and now and then a small round one near apex of iv. Rostrum reaches to or past third coxæ; last 2 segments dark; apical one blunt, not quite so long as penultimate. Cauda and anal plate rounded, hairy. The dorsal horn when flattened out is triangular.

Length 4 to 4.4 mm.

FOOD PLANTS. *Salix alba*; *S. caprea*; *S. cinerea*; *S. daphnoides*; *S. fragilis*; *S. purpurea*; *S. viminalis*; *S. aegyptica*; *S. tetrasperma*; *Populus nigra*; *Pyrus malus*; *Populus maximowiczii* (Corea); *Prunus armeniaca* and *P. persica* (India).

LOCALITIES. Kings-ton-on-Thames, ix. 1899 and 02; Esher, x. 1889; Enfield, x. 01; Wye, ix. 04; viii. and ix. 10; Cambridge

ix. 88 ; Shalford, ix. 09 ; Weybridge, viii. 90 ; Redhill, ix. 92 ; Eastbourne, xi. 94 ; Okehampton x. 96 and ix. 1900 ; Abingdon, viii. 13 ; St. Neots and Great Staughton, Hunts., x. 01 (F.V.T.) ; Harpenden (Davidson), Chester, viii. 04 (F.V.T.) ; Bangor, xi. 20 (Walton) ; Cardiff, xi. 20 (Jenkins) ; Anglesea, xi. 20 and ix. 23 (Walton) ; Harpenden (Davidson) ; Criccieth, viii. and ix., 1890 ; Bettws y Coed, vii. 03 ; Dolgelly, viii. 03 (F.V.T.) ; Llangollen, N. Wales ; Armagh, Ireland ; Washford, Oxford ; Wimbledon Common ; Battersea (B.M. Coll.) ; Great Salkeld, 1911 (Britten) Belfast ; Shere, near Guildford ; Basingstoke ; Nottinghamshire ; Carshalton and Belfast (Buckton). Europe (general). Egypt. America. Quetta, India (Buckton) ; Lahore, India (Das). Corea (Okamoto and Takahashi) ; Japan ; Foochow ; Soochow, China (Takahashi) ; Mexico (Moreira).

Observations. This large Aphid often occurs in dense colonies on the branches and twigs of Willows and Osiers and sometimes Poplars. Sometimes these colonies measure a foot or more in length and 2 to 3 inches wide. In one colony I counted up to 700 individuals, all densely packed together. Each colony is started by a single alate female. The rate of growth of a colony may be very rapid. During rather damp and wet weather one was noticed to increase from 5 to 8 inches long in four days and during that period many winged females had flown away from it. The apteræ are grouped side by side with their heads all pointing upwards. These large Lachnids are frequently attended by countless wasps, which feed upon the honey dew that falls on to the leaves below. The amount of honey dew secreted is often great and falling on the leaves below kills them and also the foliage of other plants beneath. The damaged leaves assume a black and yellow appearance. The final effect on Willows and Osiers is varied. At one time they seem to do no harm, save indirectly by causing the leaves to fall. At other times or even at the same time a neighbouring Willow will be killed outright by the actual sucking of the insects. Buckton records a case where this Lachnid swarmed in such numbers at Carshalton that trees 30 to 40 feet high had been killed. Wherever the insects puncture the bark the area is marked by a reddish-brown stain. These marks frequently occur in rows forming more or less brown streaks on the rind. This staining passes into the tissues and stains them red and in this way many Osier rods are ruined for basket making.

I have found this insect from late June into November, but by far the greatest number in September and October, when many alate females make their appearance. All the alatae I have seen carry their wings sloping downwards, but Buckton refers to them being held horizontally. The alatae remain a little while with the colonies and then crawl or fly away. Sometimes the apterae will migrate *en masse* from one tree to another. Frequently they pass round from one side of a tree or branch to another. Like other Lachnids they hold up their long hind legs when frightened, probably with the idea of warding off attacks of parasitic hymenoptera. These Lachnids when crushed give off a rich pink stain, which dyes silk especially a beautiful pink and which forms a lasting dye; it can easily be extracted with alcohol, but is never likely to be of any economic value in these days of cheap analine dyes.

I have been unable to find any males or oviparous females.

One of the remarkable things about this large Lachnid is that great numbers occur now and again, for instance at Wye it swarmed in countless numbers in 1904, but was not seen again until 1912, when it occurred in equally large numbers. Not a single specimen could be seen during the intervening period. It rarely occurs on Poplars.

Dr. Walton found it attacking apple trees in North Wales in considerable numbers, willows were growing near them. It has also been found doing the same in Northern Ireland. Vickery also places the apple amongst its food plants. The use of the large dorsal tubercle in the apterae and nymphæ is not known. Its apex has several very minute pores. It may function as an odoriferous gland.

The nymphæ are more elongate than the apterae and have a larger dorsal process and bright brown wing cases. Walker (1848) states that "Mr. Wing observed this species in great abundance on Willow shoots from the middle of September to the end of October in 1846 and he remarked that its honey dew is very attractive to moths, amongst which *Nonagra crassicornis* which very seldom touches sugar was plentiful."

Mr. Laing has examined the type of Buckton's *fuliginosus* and finds it is undoubtedly this species. Buckton's slides contain *viminalis* and *persicæ*, so *fuliginosus* is really a composite species, but Das selected the type and sank it as a synonym of *viminalis*.

PTEROCHLORUS LONGIPES Dufour (non Buckton).*

Aphis longipes Dufour.

Lachnus roboris Boyer.

Dryobius croaticus Koch, Buckton.

Dryaphis longipes Del Guercio.

Dufour, Mem. présentes Ac. Roy. Sci. Inst. France, IV., 243 (1833); Rech. Hemip. Mem. Institut., IV., 243, pl. 9, figs. 116, 117; Koch, Die Pflanz., 228, pl. xli., fig. 300 (1857); Passerini, Gli. Afidi, 33 (1860); Aphid. Ital., 67 (1863); Boyer, Ann. Soc. Ent. Fr., X., 183, 26 (1872); Macchiati, Agg. Afid., 249; Aphid. Calabria, 263; Ferrari, Aphid. Liguriæ, 234 (1872); Buckton, Mono. Brit. Aphid., III., 74, pl. civ. (1880); Schouteden, Mem. Soc. Ent. Belg., XII., 208 (1906); Del. Guercio, Redia., V., 277, T. xiii., figs. 102-111 (1908).

Alate viviparous female. Brown, thoracic lobes dark. Antennæ orange to dull yellow, apices black. Legs yellowish to tawny brown, large black apical areas to femora and small ones to tibiæ; tarsi dark; fore and mid pair moderately long, hind pair very long.



Fig. 50.—*Pterochlorus longipes* Dufour.
Apterous and Alate viviparous ♀♀.

Cornicles dark. Wings clouded with deep brown, showing two white transparent areas on basal half and two pale spots towards apex. Antennæ short, about as long as head and thorax; with numerous hairs; segment i. wider but no longer than ii., both

* *roboris* Buckton = *croaticus* Koch. *Croaticus* Buckton = *roboris* Walker = *longipes* Dufour. Mordwilko's *roboris* also = *longipes* Dufour.

dark; iii. longest, about equal to iv. + v.; iv. and v. about equal; iv. with 1 to 2 small round sensoria; v. with large primary apical one; apices of iii. to v. dark; vi. less than half of v., all dark; segments hairy. Head flat in front with many short hairs. Rostrum reaches past third coxæ. Eyes large, prominent. Body with many fine short hairs and some dark spots. Cauda and anal plate very hairy. Cornicles moderate, on dark hairy cones. Legs hairy; in some nearly all dark. Wing membrane reticulate, especially noticeable on dark areas.

Length 5.9 to 6 mm.; wing expanse 16 to 17 mm.

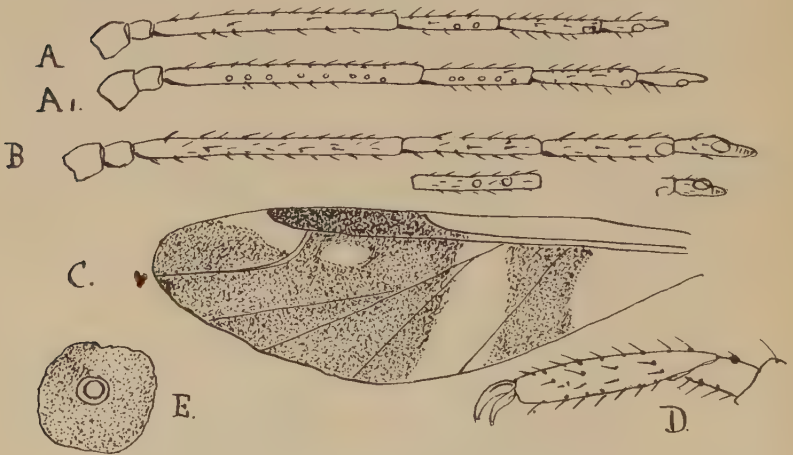


Fig. 51.—*Pterochlorus longipes* Dufour.

A. and A.1. Two forms of apterous ♀ antennæ; B. of alate ♀; C. fore wing; D. Tarsus; E. Cornicle.

Apterous viviparous female. Deep brown of various shades; the head, prothorax and mesothorax dark, with black areas; antennæ orange to yellowish-brown, base and apex dark. Legs tawny-yellow to yellowish-brown; base of the femora and the tibiæ paler, also the hind tarsi; cornicles on black cones and there are small dark spots on the abdomen and two large transverse bars caudad. Coxæ black. Antennæ narrow, a little longer than head and thorax; i. wider but no longer than ii., both dark; iii. longest, longer than iv. + v.; iv. and v. about equal; iv. with 2 to 4 small round sensoria; v. with normal primary one; vi. about one-half of v.; all segments hairy; apex of iv. and v. dark

and all vi. Head and body hairy, apex very hairy. Rostrum reaches to just past third coxæ. Cornicles on large dark hairy cones, base irregularly rounded. Legs long, especially hind pair; hairy.

Length 3 to 3.2 mm.

FOOD PLANTS. Oaks (*Quercus spp.*) and *Castanea sativa*.

LOCALITIES. Ewhurst, Sussex (E. N. Bloomfield); King's Wood, near Wye, vii.-x. 26 (F.V.T.); Woking (G. Champion); Burnham Beeches (F. G. Whitfield); Lyndhurst, New Forest, viii. 22 (F. Laing); Southwater, near Horsham (Buckton).



Fig. 52.—*Pterochlorus longipes* Dufour.
Abdomen of Apterous viviparous ♀.

Sweden; Croatia; Belgium (Schouteden). Florence, v., ix. 19, on *Quercus cerris* (Davidson). France (Laing).

Observations. This beautiful species has not often been observed in this country. The alate female is described from one given me by Mr. F. Laing. Koch and Buckton describe it as *Dryobius croaticus*. Buckton says it is not uncommon in several parts of England. This aphid is said to prefer the branches springing from old oak stumps, but I have also seen them high up on the older trees. Those observed occurred in scattered colonies and crawled about readily. The ant *Formica rufa* largely attends it. One can nearly always detect a colony

by the business of the large ants on the tree ; sometimes they may be seen crawling in long columns up and down the trunks of oak trees where the aphides are living. This large Lachnid occurs late into November and the eggs are laid in scattered rows, close together, these rows are more or less parallel ; they are covered with a gummy coating. I have found the eggs hatching out in mid April.

Apterous viviparæ have been observed in King's Wood as late as mid November and although it swarmed there for two years I could never find any alatae.

A specimen of a nymph I have shows a row of 8 small round sensoria on antennal segment iii. and 5 to 7 on iv.

PTEROCHLORUS ROBORIS Linnæus.

Aphis roboris Linnæus.

Cinara roboris Curtis.

Lachnus roboris Kaltenbach.

Pterochlorus roboris Passerini.

Dryobius roboris Koch.

Linnæus, Syst. Nat., III., 735, 22 (1767) ; Fabricius, Syn. Ins., III., 388, 37 (1781) ; Schrank, Fn. Boica, II., 113 (1801) ; Fabricius, Syst. Rhyng., 294, 42 (1803) ; Curtis, Brit. Ins., XII., 576 (1835) ; Kaltenbach, Mono. Pflanz., I., 148-2 (1843) ; Walker, Ann. Nat. Hist., Se. 2, 106, 43 (1848) ; Rondani, Nuov. Ann. d. Sc. Nat. Bologna., IX., 386 (1848) ; Walker, List. Homop. (B.M.), IV., 959 (1852) ; Koch, Die Pflanz., 226 (1857) ; Passerini, Gli. Afidi, 29 (1860) ; Ferrari, Aphid. Liguria, 234 (1872) ; Buckton, Mono. Brit. Aphid., III., 74, pl. civ. (1880) ; Schouteden, Mém. Soc. Ent. Belg., XII., 208 (1906) ; Del Guercio, Redia, V., 273, T. xii., figs. 84-90 (1908).

Alate viviparous female. Blackish-brown to blackish ; thorax darker ; legs tawny brown ; coxæ, apical half of femora, base and apex of tibiæ and the tarsi dark, most of hind tibiæ dark. Wings with clouded deep brown ornamentation much as in the former species. Antennæ about as long as head and thorax ; segment i. a little wider and longer than ii. ; iii very long, about as long as iv. + v. + vi. ; with 6 round sensoria, 2 small ones basally and 2 small ones in middle ; iv. and v. about equal ; iv. with 3 large sensoria or 2 large and 2 small ; primary one on v. round ; vi.

very small, the "nail" less than half base, with 1 large primary and 1 small sensorium near it, hairy. Rostrum reaches past third coxæ. Head and body hairy. Cornicles on dark hairy cones. Legs hairy.

Length 3.2 to 3.4 mm.

Apterous viviparous female Shiny metallic black to deep coffee-brown. Antennæ brownish-yellow, apex dark. Eyes dark brown. Legs yellowish-brown; apices of femora and tibiæ dark; tarsi dark; hind pair long; all hairy. Head and body hairy. Cornicles on large dark hairy cones. Rostrum to third coxæ.

FOOD PLANTS. Oaks (*Quercus cerris*, *Q. ilex*, *Q. robur*); also recorded from *Pinus sylvestris* and *Picea excelsa*.

LOCALITIES. Guestling and Oare, Sussex (E. N. Bloomfield); King's Wood, near Wye, viii. to x. 1926; New Forest, viii. 15; Esher, ix. 89 (F.V.T.); Southgate, 27 vii. and viii. 47 (Walker) in Dublin Museum; Chandler's Ford, New Forest, 25 iv. 12 (Duffield). Belgium (Schouteden); Italy (Rondani, Ferrari, Passerini, etc.); Holland (V. d. Goot).

Observations. Apparently an uncommon species. It occurs in large colonies where it does appear, the individuals being rather widely separated from one another. They mainly seem to occur on the smaller branches and twigs and like the former species they are much attended by the large wood ant (*Formica rufa*), which get very agitated if one disturbs a colony of the plant lice.

Schouteden gives Altum's *exsiccator* as a synonym, but Van der Goot treats it as a distinct species. Ferrari (p. 234) points out the differences between *roboris* Linn. and *longipes* Dufour, and also gives Burmeister's *fasciatus* as a synonym, but the latter is a true *Lachnus*.

PTEROCHLORUS EXSICCATOR Altum.

Aphis exsiccator Altum.

Schizodryobius exsiccator V. d. Goot.

Altum, Forst. Zool., 353, fig. 50 (1884); Van der Goot, Tijdschr. v. Ent., LVI. (1913); Van der Goot, Beit. z. Kennt., Holland, Blattläuse, 412 (1915).

Van der Goot treats this as a separate species, separating it from *roboris* as follows :

1. Das sechste Fühlerglied auffallend kurz, nur halb so lang wie das fünfte glied. Die Art lebt auf Buchen

exsiccator Altum.

Das sechste Fühlerglied nicht auffallend kurz, etwas von $\frac{2}{3}$ der Länge des fünften glieder. Die Art lebt auf Eichen

roboris Linn.

PTEROCHLORUS ROSÆ Cholodkovsky.

Lachnus rosæ Cholodkovsky.

Maculolachnus rosæ Gaumont.

Nippolachnus rosæ Wilson.

Lachnus rosarum V. der Goot.

Lachnus maculatus Licht. (ined.)

Cholodkovsky, Zool. Anz., XXII., 471 (1899) ; Van der Goot, Tijds. v. Ent., LV. (1912) ; Van der Goot, Beit. z. Kennt. d. Holl. Blattläuse, 408 (1915) ; Gaumont, Bull. Soc. Ent. France, 26-31 (1920) ; Patch, Jour. Eco. Ent., X., 418 (1917) ; Wilson, Hemip. Connecticut, 258 (1923) ; Laing, Entom., LVIII., 19-20 (1925).

Apterous viviparous female. Antennæ as long as head and thorax, deep brown ; segment i. wider but no longer than ii. ; iii. longest, longer than iv. + v. with a few small round and irregular

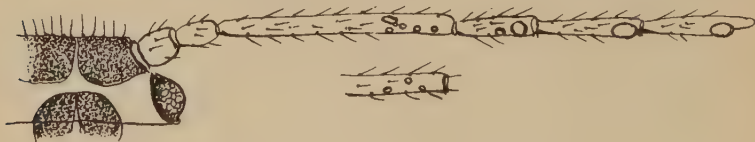


Fig. 53.—*Pterochlorus rosæ* Cholodkovsky.
Head and antenna of apterous viviparous ♀.

sensoria at apex ; iv. shorter than v., with two unequal and varied sized sensoria at apex ; v. and vi. about equal ; v. with a large round primary sensorium ; vi. normal ; all segments with rather long, thin hairs. Head brown ; flat in front, with longish hairs. Eyes large, tubercle small. Rostrum reaches past third coxæ ; apical segment about same length, but narrower than penultimate. Body with numerous small dark round spots,

from each of which arises a hair ; 7 larger dark spots each side and also 3 lines of darker glandular spots each side ; 2 large dark areas and a transverse dark bar caudad. Anal plate and cauda dark. Cornicles dark, conical, with numerous hairs, bases



Fig. 54.—*Pterochlorus rosæ* Cholodkovsky.
Apterous viviparous ♀.

irregular. Legs deep brown, hind pair long, all the segments with moderately long hairs ; middle of tibiae and base of femora paler colour than the rest.

Length 2.5 to 3 mm.

FOOD PLANT. Roses (roots).

LOCALITIES. Weybridge, Surrey, 6 xi. 1924 (Fox-Wilson) ; Germany (Cholodkovsky) ; Holland (V. d. Goot), U.S.A.

Observations. This Lachnid occurs on the roots of roses and is probably an introduced species. I have only seen apteræ. Mr. Laing records this insect from specimens sent him by Mr. Fox-Wilson, Van der Goot describes the wingless oviparous female. The body is black ; eyes, antennæ and legs black ; body oval, plump, with very small black spots and hairy ; antennæ short, about half the length of the body, with moderately long hairs ; segment iii. longest, about twice vi. ; iv. and v. about equal ; iii. with 4 to 5 sensoria ; iv. with 2 ; v. with 1 ; vi. with 1 (+4-6). Rostrum reaching to third coxæ.

Genus STOMAPHIS Walker.

Rhynchoscles Altum.

Walker, Zoologist, XXVIII., 2000 (1870); Altum, Forst. Zool., III., 356 (1882); Buckton, Mono. Brit. Aphid, III., 63 (1881); Del Guercio, Redia, V, 255 (1908); V. d. Goot, Beit. z. Kennt. Holl. Blattläuse, 417 (1915); Baker, Bull. 826, U.S. Dep. Agri., 18, pl. ii., M-R (1920).

Antennæ of 6 segments, with many hairs and the alatae with large sub-circular sensoria. Head rounded in front. Eyes large, with marked ocular process. *Rostrum very long*, often three times as long as body. Cornicles on very large and shallow hairy cones.

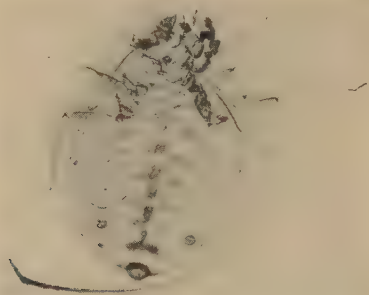


Fig. 55.—*Stomaphis quercus* Linnæus.
Apterous ♀. Note long rostrum.

Wings large; in the fore wings the radial sector rather long and slightly curved; media twice forked; hind wings with media and cubitus widely separated. Males apterous and with rudimentary mouth parts.

A very marked genus erected by Walker with Linnæus' *Aphis quercus* as type. Altum's genus was founded on Fabricius' *Aphis longirostris*, which is so closely related to *quercus* that the apteræ appear almost the same superficially. The very marked elongate rostrum at once separates this genus from any other.

Two species occur in Great Britain, namely:

1. *Stomaphis quercus* Linnæus, and
2. *Stomaphis longirostris* Fabricius.

Both are very uncommon. The two species may at once be separated by the antennæ (vide figure 57).

Van der Goot considers Boyer's *Phylloxera longirostris* the same as *Stomaphis quercus*. It is taken here to be Fabricius' *longirostris*.

STOMAPHIS QUERCUS Linnæus.*

Aphis quercus Linnæus.

Lachnus quercus Kaltenbach.

Stomaphis quercus Walker, Buckton.

Aphis fusca Geoffroy ?

Linnæus, Fn. Suecicæ, I., 545, 24 (1746) ; Syst. Nat. II., 735, 24 (1758) ; Schrank, Fn. Boica, II., 112, 1238 (1801) ; Kaltenbach,



Fig. 56.—*Stomaphis quercus* Linnæus.
Apterous ♀.

Mono. Pflanz., I., 164 (1843) ; Walker, List. Homop. (B.M.), IV., 961 (1852) ; Passerini, Aphid. Ital., 65 (1863) ; Macchiati, Aphid. Calabria, 262, 121 (1883) ; Buckton, Mono. Brit. Aphid., III., 62 (1881) ; Cholodkovsky, Bull. Soc. Imp. Nat. d. Moscow, 1 (1894) ;

* Both Schouteden and Macchiati treat *longirostris* Boyer (nec Fabricius) as a synonym of *quercus*. Boyer says it is the *Aphis quercus* of Fabricius-Rossi.

Del Guercio, Afid. Italica, 109; Redia, V., 256, T. x., figs. 30-38 (1908); Schouteden, Mem. Soc. Ent. Belg., XII., 208 (1906); V. d. Goot, Beit. z. Kennt. Holl. Blatt., 418 (1915); Laing, Ent. Mo. Mag., IX., 245 (1923).

Apterous viviparous female. A large shiny brown to almost black aphid, oblong in form and with many hairs; a very long rostrum often three times the length of the body and passing beneath it, giving the appearance of a long tail. Eyes deep brown. The antennæ rather slender, not quite half as long as the body, deep brown, except segment iii. which is ochraceous. Legs rather long and thin, deep brown, the femora and tibiæ having large ochreous basal areas. Antennal segment i. much longer and a little wider than ii.; iii. longest, a little longer than vi.; iv. and v. about equal; vi. longer than v.; hairs short. Segment iii. has 3 sensoria; iv. 4-5; v. 1; vi. 1 (2-3).

Length 5.2 to 5.8 mm.

Alate viviparous female. Brown to deep brown; head and thorax darker. Rostrum very long, passing nearly twice the length of the body from it, usually curved. Wings longer than body, narrow. Antennæ brown, iii. paler, as long as head and thorax. Legs moderate. Cornicles large, dark, opening eccentric. Cauda and anal plate rounded, hairy. Antennal segment i. wider and a little longer than ii.; iii. longest, but not quite so long as iv. + v. + vi., with 10-15 oval sensoria of varied sizes; iv. a little shorter than v., with 3-4 small round sensoria; v. not quite so long as vi.; primary sensoria normal on v. and vi. Wings rather long and very narrow, venation as shown in figure. (Fig. 57.)

Length 5 to 5.6 mm.

FOOD PLANTS. *Quercus alba*; *Q. robur*; *Q. pedunculat* 1.

LOCALITIES. Weybridge and Finchley (Walker and Buckton); Weybridge; Wimbledon Common, vii. 23 (Donisthorpe); Dulwich, Woking, Tubney, Oxford (B.M. Coll.); Belgium (Schouteden); Holland (Van der Goot).

Observations. Uncommon; the alatae especially rare. It has been confused with Fabricius' *longirostris* but can at once be demarked by the difference in the antennæ, especially by the longer sixth segment and the sensoria. Donisthorpe found it attended by *Lasius fuliginosus*. Van der Goot also records *Lasius niger* with it.

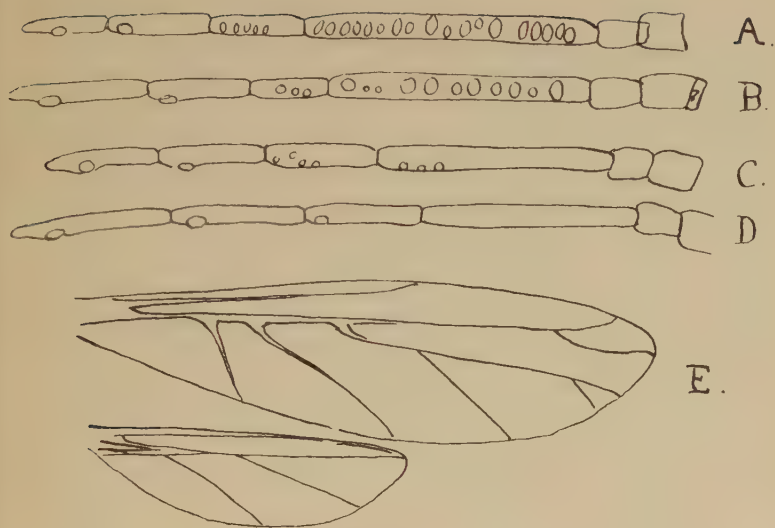


Fig. 57.

A. and C. antennæ of alate and apterous ♀♀ of *Stomaphis longirostris* Fab. ;
 B. and D. of *S. quercus* Linn. ; E. Wings of *Stomaphis*.

STOMAPHIS LONGIROSTRIS Fabricius.

Aphis longirostris Fabricius.

Lachnus longirostris Passerini.

Stomaphis longirostris Horvath.

Rhynchocles longirostris Altum.

Fabricius, Ent. Syst., IV., 210, 2 (1794) ; Syst. Rhyng., 294 (1803) ; Passerini, Gli. Afidi, 38 (1860) ; Aphid Italicæ, 65, 5 (1863) ; Boyer, Ann. Soc. Ent. Fr. X. 197 (1841) ; Ferrari, Aphid Liguriæ, 81 (1872) ; Altum, Forst., Zool., 356 and 232, fig. 23 (1882) ; Horvath, Fn. Reg. Hung., 61 ; Del Guercio, Nuove Relaz. P. Staz. Ento. Agri. Firenze, II., 109, 2 ; Cholodkovsky, Bull. Soc. Imp. Nat. d. Moscow, 6 ; Del Guercio, Redia, V., 259, X., figs. 39-49 (1908) ; Donisthorpe, Ent. Rec., 136, XXXVI. (1925).

Apterous viviparous female. Very similar to the former species in general form. Antennæ narrow, shorter than head and thorax, with numerous fine hairs ; segment i. wider and longer

than ii., iii. the longest, with 3 to 7 small round sensoria, the specimen described shows 7 more or less in a line on one antenna and 4 irregular sized ones near the apex on the other ; iv. a little less than half the length of iii. ; with 4 round sensoria, two usually smaller than the others ; v. a little longer than iv., to about same length, with a large projecting apical sensorium ; vi. with a large round primary sensorium and two very small ones away from it. Eyes rather small, with comparatively few facets. Body in cleared specimen showing six dark, irregular oval, median patches and six irregular, broken pairs of transverse brown patches each side of them ; numerous other small dark glandular spots. Cornicles on small dark cones with scattered hairs. Anal plate and cauda dark brown, finely hairy, also the whole body. Legs rather short with many fine hairs. Rostrum nearly twice as long as body ; last two segments nearly equal ; apex horny ; finely hairy.

Length 5.8 to 6.4. mm.

Alate viviparous female. Antennæ differ from former species : i. longer than ii. ; iii. with 17 to 20 oval sensoria of different sizes, about as long as iv. + v. + vi. ; iv. and v. about equal ; iv. with five small oval sensoria on the apical half ; v. longer than vi. ; both with a large round primary sensorium.

Length 4.5 to 5.5 mm.

FOOD PLANTS. Oaks, *Quercus* sp. ; *Acer campestre* ; *A. negundo* ; *Populus alba* ; *P. nigra* ; *Salix alba* ; *S. viminalis* ; *Thuja occidentalis*.

LOCALITIES. Windsor Forest, 8 v. 24 (Donisthorpe) ; Italy (Del Guercio, etc.).

Observations. Evidently a very rare species. Similar to *S. quercus* but easily told from the latter by the alate ♀ having the antennal segment vi. shorter than v. and by the greater number of sensoria on iii. and in the apteræ by the presence of sensoria on iii. and iv. and by v. and vi. being nearly equal ; in *quercus* vi. is a little the longer. Donisthorpe found this aphid attended by the ant *Lasius brunneus*. Wilson and Vickery also say "from ant nest." Ferrari refers to this species (p. 81) with query and gives the food plants as *Salix viminalis*, *S. alba* and *Populus nigra* in September and October.

Sub-tribe EULACHNINA.

Body elongate, slender. Eyes large and prominent, but show no ocular process. Antennæ slender, with bristles, not slender hairs. Cornicles shallow, not on marked cones. Cauda rounded. Legs rather long.

This sub-tribe can at once be demarked from the *Lachnina* by the elongate body, absence of ocular process and non-hairy base to the cornicles.

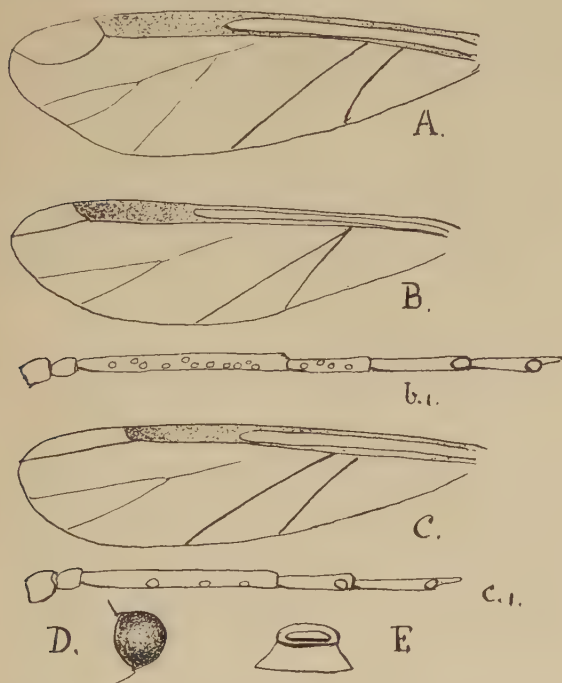


Fig. 58.

A. Wing of *Pterochlorus*; B. of *Eulachnus*; b. 1. Antenna of six segments; C. Wing of *Essigella*; C. 1. Antenna; D. Eye of B with no ocular process; E. Cornicle of B. and C. without hairs.

Three genera are known: viz.: *Essigella*, Del Guercio; *Eulachnus*, Del Guercio and *Todolachnus* Matsumura.

Baker gives the following key to these:—

- | | |
|---|--------------------|
| 1. Antennæ of 5 segments, with small bristles | <i>Essigella</i> . |
| Antennæ of 6 segments | 2. |

2. Media once branched ; long, stout antennal spines *Eulachnus*.
 Media twice branched *Todolachnus*.
 Of these *Eulachnus* only is represented in Great Britain.

Genus EULACHNUS Del Guercio.

Protolachnus Theobald.

Del Guercio, Revista Patol. Vegetale, n.s. III., 329 (1909) ;
 Curtis, Brit. Ent. XII., sec. 576 (1835) ; Theobald, Bull. Ent.
 Res. VI., 145 (1915).

Antennæ of six segments, with rather long bristles. Body
 elongate and narrow. Cornicles as rings, not on hairy cones.
 Eyes large and outstanding, no ocular process. Fore wings
 with media once branched, faint ; hind wings with media and
 cubitus, both often faint. The type is Kaltenbach's *agilis*,
 set by Wilson ; Del Guercio mentioned no specific type. The
 type of my *Protolachnus*, namely, *tuberculostemmata* is closely
 related, if not the same. A single species is so far known in
 Great Britain, the *agilis* of Kaltenbach.

EULACHNUS AGILIS Kaltenbach.

Lachnus agilis Kaltenbach.

Aphis agilis Walker.

Lachnus pineti Koch (part).

Schizolachnus agilis Mordwilko.

Eulachnus agilis Del Guercio.

Kaltenbach, Die Pflanz., 1, 161 (1843) ; Walker, Ann. Nat.
 Hist., Se. 2, 11, 108, 44 (1848) ; List. Homop. (B.M.), IV., 960,
 45 (1852) ; Supp., 298, 11 (1858) ; Koch, Mono. Pflanz., 230,
 pl. XLI., fig. 304 (1857) ; Buckton, Mono. Brit. Aphid., III., 47
 (1881) ; Mordwilko, Ann. d. Mus. Zool. d. Acad. Imp. d. Sc. XIII.,
 375 (1908) ; Cholodkovsky, Horæ. Soc. Ent. Ross. XXXI., 646
 (1898) ; Del Guercio, Redia, V. 317, I., XVIII., figs. 222-230
 (1908) ; Jackson, Scot. Nat., 165 (1919) ; Schouteden, Mém.
 Soc. Ent. Belg, XII., 203 (1906) ; Van der Goot, Beit. z. Kennt.
 Holl. Blattläuse, 389 (1915) ; Tijds. v. Ent., 114 (1918) ; Wilson,
 Hemip. Connect., 270 (1923).

Alate viviparous female. Green of various pale shades, some
 inclining to yellowish ; thorax pale reddish-brown, the lobes
 somewhat darkened ; pronotum green, with now and then two

darker spots. Antennæ brownish-green. Legs yellowish-green ; apices of femora and tibiæ dark and the tarsi. Abdomen, especially in front, with dusky spots, from each of which arises a bristle. The whole insect is linear in form. Head and legs with rather long stiff bristles. Cornicles dusky. Antennæ not half length of body ; i. wider than ii. ; iii. longest, about twice iv., with 6 to 9 round sensoria, of unequal size and with outstanding chaetæ ; iv. shorter than v., some specimens showing 2 to 4 sensoria ; v. longer than vi., with a large primary sensorium and a small secondary below it ; vi. with a short flagellum ; iv. to vi. with some outstanding chaetæ. Rostrum reaches nearly or quite to the second coxæ ; apex dark and broad. Some specimens are very mealy, others slightly so.

Length 1.7 to 1.9 mm.

Apterous viviparous female. Bright green to yellowish-green, with small reddish-brown to brown spots, from each of which arises a stiff hair. Linear in form. Head with long chaetæ. Antennæ dusky green, some show dusky areas. Legs long, green,

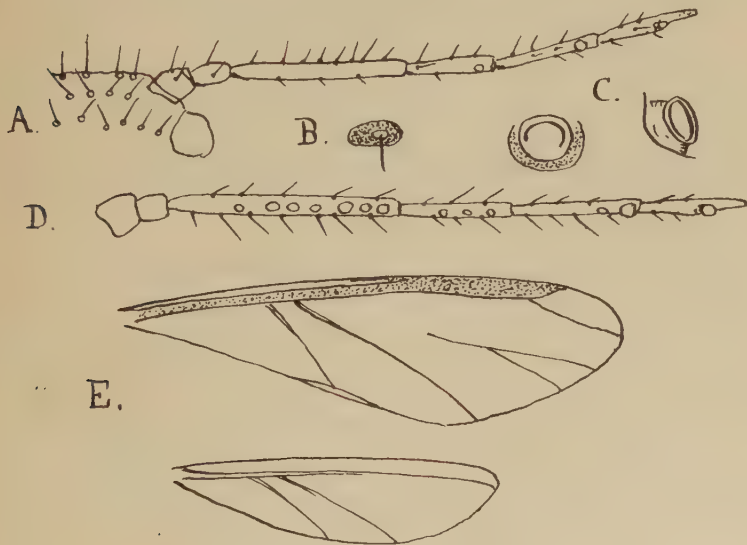


Fig. 59.—*Eulachnus agilis* Kaltenbach.

A. Head and antenna of apterous ♀ ; B. Body tubercle ; C. Cornicles
D. Antenna of alate viviparous ♀ ; E. Wings.

with stout bristles, also the antennæ. Rostrum blunt, reaching to second coxæ; apex dusky. Antennæ narrow, not half the length of the body; segment i. wider than ii.; iii. the longest, nearly to quite twice as long as iv.; iv. shorter than v.; often a single sub-apical sensorium; v. a little longer than vi. with a large primary sensorium; vi. with flagellum short and blunt; segments iii. to vi. narrow; iii. to v. with stiff hairs. Cornicles as small elevated rings, dark.

Length 1.7 to 1.9 mm.

Male. Alate. Head and thorax grey, due to fine grey tomentum; when denuded, dark; abdomen green, with a fine dusting of white tomentum and small black spots. Venter of prothorax green; rest of body grey; venter of abdomen pale green with small black dots. Eyes dark reddish-brown. Antennæ dark brown; the two basal segments with grey tomentum; segment iii. pale ochreous; coxæ and femora pale green; tibiæ pale ochreous, in some brownish; tarsi dark. Rostrum pale ochreous-green, apex dusky. Wings tinged with smoky grey. Antennæ long, nearly as long as body; iii. longest, not so long as iv. + v., with many sensoria; iv. a little shorter than v., with 21 to 32 sensoria; v. with 11 to 25; vi. more than half of v., nail small; a few stiff hairs on iii. to v. Fore and mid tibiæ with stiff bristles one side, short fine ones the other; similar stiff hairs each side of hind tibiæ. Body with a few hairs, many longer ones on anal region. Cornicles small dark, rather flat.

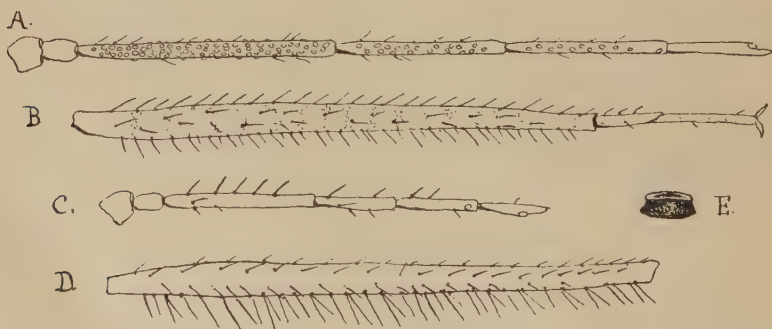


Fig. 60.—*Eulachnus agilis* Kaltenbach.

A. Antenna of ♂; B. Hind leg; C. Antenna of oviparous ♀; D. Hind tibia of oviparous ♀ (sensoria not shown); E. Cornicle.

Oviparous female. Apterous. Green, with dark hairs; eyes large, red and black. The dark hairs arise from dark spots. Hairs on thorax a little paler. Venter same colour as dorsum; under a high power the upper and under surfaces of the body show a fine dusting of silvery tomentum. Antennæ same colour as body, but with dusky marks. Cornicles as small dark rings, slightly elevated. Caudal region dusky. Legs pale dusky yellowish-green; tibiæ and tarsi pale brown, with short, stiff hairs. Antennæ about as long as head and thorax; segment iii. longest, but not so long as iv. + v.; iv. and v. about equal; vi. a little shorter than v.; a few black spines on iii. to v. Rostrum obtuse, reaching to third coxæ. Hairs on head particularly dark and spiny. Six small papillæ each side of body. Hind tibiæ with 100-120 small sensoria. Each female contains 2 to 3 ova.

Nymph. Head pale greenish-ochreous with fine dusting of white tomentum and many black bristles arising from dark tubercles. Eyes dark red. Thorax pale yellowish-green, with fine white tomentum. Abdomen green, with black dots and white tomentum. Cornicles as black, slightly elevated rings. Wing pads olive-brown. Antennæ pale ochreous, distal end of each of the segments iii. to v. dusky. Legs pale ochreous, femora tinged with green, a dark spot at junction of tibiæ and femora; tarsi brown. Venter of head and thorax pale ochreous-green; all with fine grey tomentum. Rostrum pale ochreous-green, apex dusky.

Larvæ. Same colour as apterous female; posterior legs very long.

FOOD PLANTS. *Pinus sylvestris*; *P. halepensis*; *P. pinaster*.

LOCALITIES. Woking, 19 iv. 13; 30 v. 15; viii. 15; Wye, 1 x. 23; Brockenhurst, 20 viii. 15; Hastings, viii. 09; Farnham, vi. 12; Exmouth, viii. 10; Isle of Wight, viii. 15; Brondesbury, London, vii. 08 (F.V.T.); Crowborough, 28 vii. 17 (Jackson); Aberglaslyn, Wales, 2 v. 13 (F.V.T.); Scotland (Evans); Rothes, Morayshire, N.B., 29 ix. 17 (Jackson). Haslemere; Bramshot; Walthamstow (Buckton); Southgate (Walker); Midhurst; Oxshott; Bagshot; and Salsey, Northants (Laing). Belgium (Schouteden); Italy (Del Guercio); Germany (Kaltenbach, etc.); Hong Kong (Takahashi and Van der Goot).

Observations. Fairly common on the needles of Scot and Austrian Pines, especially on and amongst the tender needles.

It is a very active species. The sexuales were found by Miss D. Jackson in Scotland.

Sub-tribe LACHNINA.

The radial sector of fore-wings is short and straight and almost reaches the tip of the wing ; cornicles on hairy cones ; eyes with distinct ocular tubercles.

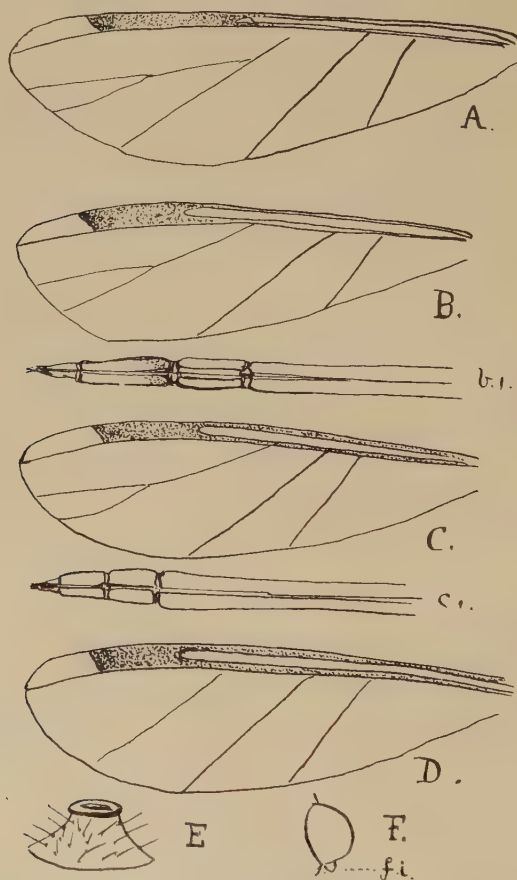


Fig. 61.—Wings of *Lachnina*.
 A. *Panimerus* ; B. *Lachnus* ; C. *Schizolachnus* ; D. *Unilachnus* ; b.i.
 Rostrum of *Lachnus* ; c.i. of *Schizolachnus* ; E. Hairy cornicle of *Lachnus* ;
 F. Eye with ocular process (f.i.).

A large number of species occur in this sub-tribe.

Baker recognises four genera, as follows :

- | | |
|---------------------------------------|------------------------|
| 1. Media of fore wings twice branched | * <i>Panimerus</i> . |
| Media not twice branched | 2 |
| 2. Media once branched | 3 |
| Media simple | <i>Unilachnus</i> . |
| 3. Labium lance-like | <i>Lachnus</i> . |
| Labium obtuse | <i>Schizolachnus</i> . |
- Panimerus*, *Lachnus* and *Schizolachnus* occur in Great Britain.

BRITISH SPECIES OF *Lachnina*.

1. *Panimerus pinicola* Kaltenbach.
Lachnus pinicola Kaltenbach.
Eulachnus pinicolus Del Guercio.
Lachniella pinicola Jackson.
Dilachnus pinicola Baker.
2. *Panimerus pinihabitans* Mordwilko.
Lachnus pinihabitans Mordwilko.
Lachnus pinicola Walker and Buckton.
Dilachnus pinihabitans Mordwilko.
3. *Panimerus piceæ* Walker.†
Aphis piceæ Walker.
Lachnus piceæ Walker.
Lachnus vanduzeei Swain.
Dilachnus piceæ Walker.
4. *Panimerus laricis* Walker.
Aphis laricis Walker.
Lachnus laricis V. d. Goot.
Lachniella laricis Jackson.
Dilachnus laricis Walker.
5. *Panimerus pichtæ* Mordwilko.
Lachnus pichtæ Mordwilko.
6. *Panimerus cilicica* Del Guercio.
Lachniella cilicica Del Guercio.
7. *Panimerus pini* De Geer.
Aphis nudus-pini De Geer.

* This genus was formerly called *Dilachnus*.

† As Panzer's *piceæ* (= *grossus* Kalt.) has precedence over Walker's name, *vanduzeei* (Swain) takes the place of *piceæ* Walker.

- Aphis pini* Linnaeus.
Lachnus pini Kaltenbach.
Lachnus nudus Mordwilko.
Lachniella pini Jackson.
Eulachnus nudus Del Guercio.
Dilachnus nudus Baker.
8. *Panimerus cupressi* Buckton.
Lachnus cupressi Buckton.
Dilachnus cupressi Baker.
9. *Panimerus juniperi* De Geer.
Aphis juniperi De Geer.
Aphis juniperi Fabricius.
Aphis juniperi Schrank.
Lachnus juniperi Kaltenbach.
Lachniella juniperi Del Guercio.
Dilachnus juniperi Baker.
10. *Panimerus hyalinus* Koch.
Lachnus hyalinus Koch.
Lachnus macrocephalus Buckton.
Lachniella hyalinus Del Guercio.
11. *Panimerus tugæ* Del Guercio.
12. *Lachnus costatus* Zetterstedt.
Aphis costata Zetterstedt.
Aphis fasiatus Burmeister.
Dryobius cistatus Buckton.
Lachniella fasciata Del Guercio.
13. *Schizolachnus tomentosus* De Geer.
Aphis tomentosus De Geer.
Lachnus tomentosus V. d. Goot.
Aphis pineti Fabricius.
Lachnus pineti Hartig.
Lachnus piniphila Ratzeburg.
Pinetifex Amyot.
Schizolachnus tomentosus Mordwilko.
14. *Lachnus* (*Panimerus*) *abietis* Walker.*
 15. *Lachnus* (?) *formicophilus* Buckton.*

* Vide Appendix.

Genus PANIMERUS Laing (n.n.).**Dilachnus* Baker.*Wilsonia* Baker.

Laing, Entomologist, 59, 329 (1927) ; Baker, Canad. Ent., 51, 253, 212 (1919), and Bull. 826, U.S. Dep. Agri., 16 (1920).

Media of forewings twice branched ; hind wings with media and cubitus. Antennæ of 6 segments, with fine hairs and circular sensoria. Cornicles on rather large hairy cones. Eyes large with distinct ocular process.

The type fixed by Baker was the *Lachniella gracilis* (Wilson). Both of Baker's names were preoccupied and in consequence Laing renamed the genus *Panimerus*. *Dilachnus* was appropriated for a genus of *Cerambycidae* (Fairmaire, Ann. Soc. Ent. Belg., 40, 275, 1896).

The genus is easily demarked by the media of the fore wings being twice branched.

PANIMERUS PINICOLA Kaltenbach.*Lachnus pinicolus* Kaltenbach.*Lachniella pinicola* Jackson.*Eulachnus pinicolus* Del Guercio.

Kaltenbach, Mono. Pflanz., 154 (1843) ; Ferrari, Aphid. Liguriæ, 81 (1872) ; Mordwilko, Zool. Anz., 18, 100 (1895) ; Schouteden, Mem. Soc. Ent. Belge., XII., 207 (1906) ; Del Guercio, Redia, V. 331, T. XIX., figs. 353-356 and T. XX., figs. 257-259 (1908) ; Jackson, Scott. Nat., 165 (1919).

Alate viviparous female. Head dark brown ; thorax especially metanotum dark brown ; pronotum paler ; abdomen pale, ochreous brown to pure ochreous, the dorsum and lateral part of abdomen thickly coated with white tomentum, which is distributed much more sparsely over the remainder of the body : eyes deep brown ; cornicles dark ; legs ochreous ; apices of femora, tibiæ and the tarsi dark ; the rostrum is pale brown, the apex dark ; costa and stigma pale brown. Antennæ shorter than the head and thorax ; segment i. a little shorter than ii. ; iii. longest, longer than iv. + v. ; iv. smaller than v., with 2 round

* Mr. Laing tells me that *Panimerus* is preoccupied in the *Psychodidae* for a genus found in the Seychelles (Eaton, Trans. Linn. Soc. 15, 425, 1913) and the new name *Neochmosis* is proposed here by him.

sensoria ; vi. equal to iv. ; the primary sensorium on v. normal ; all the segments with fine hairs. Rostrum acuminate, reaching to third coxæ. Head and body with short hairs. Body with three lines of dark spots each side and small dark lateral spots.

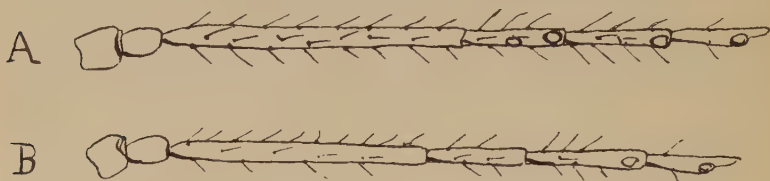


Fig. 62.—*Dilachnus pinicola* Kaltenbach.
A. Antenna of alate ♀ ; B. of apterous ♀.

Apterous viviparous female. Rich ochreous red, thickly covered with tomentum ; thorax and abdomen uniform in colour ; the cornicles dark. Eyes dark brown. Legs pale ochreous ; tarsi dark. Rostrum pale brown, apex darkened. The antennæ shorter than head and thorax ; segment i. wider but nearly as long as ii. ; iii. the longest, equal to iv. + v. ; iv. a littler shorter than v. ; vi. equal to iv. ; all the segments with moderately long, fine,



Fig. 63.—*Panimerus pinicola* Kaltenbach.
Apterous viviparous ♀.

pale hairs ; rostrum reaches to third coxæ, acuminate. Head and body hairy ; body with three lines of small dark dots each side, two smaller central ones and small dark lateral spots. Cornicles

rather small and hairy. Legs moderately long and rather thick ; femora and tibiæ with dense fine hairs ; a dark patch before the cauda.

Length 2.5 mm.

Nymph. Head brown, tinged with red ; thorax dull dirty greenish ; abdomen ochreous, with brown dots ; cornicles and a patch around each, pale chestnut brown ; eyes dark brown ; legs dull ochreous ; tarsi tinged with green ; rostrum greenish-brown ; antennæ pale ochreous ; wing-pads greyish-green ; venter same colour as dorsum.



Fig. 64.—*Panimerus pinicola* Kaltenbach.
Body markings of apterous ♀.

Larva. Pale dull ochreous ; head and cornicles darker and with 2 lateral lines, each of 18 small dark dots, arranged in a double row, not showing in quite fresh specimens, as the body is covered with white tomentum.

FOOD PLANTS. *Picea excelsa* ; *Pinus* "*mughus*" ; *Pinus sylvestris* and *Larix decidua*.

LOCALITIES. Swordale, Ross-shire, 6 vii. 18 (Jackson) ; Bournemouth vii. 13 ; East Peckham, vi. 06 ; Kennington, vii. 04 ; Wye, 1 vii. 17 (F.V.T.) ; Belgium (Schouteden) ; Italy (Ferrari) ; Germany (Kaltenbach).

Observations. This species does not seem to be widely distributed. It occurs especially on the young spruce shoots, often many close together.

The *pinicola* of Walker and Buckton is not Kaltenbach's species but is the *pinihabitans* of Mordwilko.

I am not sure if Del Guercio's *pinicola* is the same.

N
~~PANIMERUS PINIHABITANS~~ Mordwilko.

Lachnus pinihabitans Mordwilko.

Lachnus pinicola Walker, Buckton.

Mordwilko, Zool Anz., 98 (1895) and Rab. Lab. Zool. Univ. Petersbg., 118 (1895); Cholodkovsky, Horæ Soc. Ent. Ross. XXXI. 635 and 638 (1898); Jackson, Scott. Nat. Sep., 165 (1919); Swain, Ent. News., Phil., XXXII., 227 (1921); Walker, Ann. Nat. Hist., Se. 2, II., 98, 25 (1848); Buckton, Mono. Brit. Aphid., III., 52, pl. XCVIII (1881).

Alate viviparous female. Head and prothorax covered with slaty grey tomentum; a V-shaped piece of slaty-grey tomentum in front of mesothorax; each side of it the thoracic lobes are blackish grey, behind them a median rounded slaty grey area covered with tomentum and edged posteriorly with white, in some specimens the thorax uniformly grey. Abdomen dark brownish-grey with transverse bands of whitish tomentum, which expand in the middle of the dorsum and in some specimens fuse to form a whitish-grey dorsal shade which then appears to consist of narrow diamond-shaped whitish-grey spots applied closely

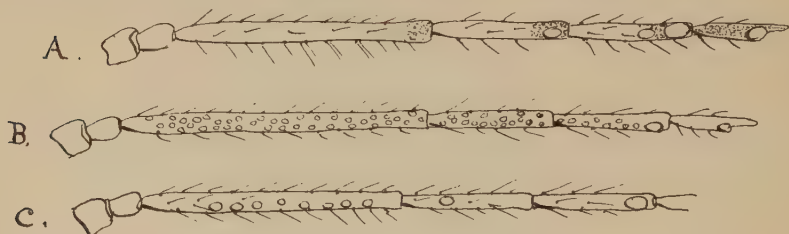


Fig. 65.—*Panimerus pinihabitans* Mordwilko.
 A. Antenna of apterous ♀; B. Male and C. of alate ♀.

together; a narrow undulating whitish-grey line along each side. Cornicles black. Antennæ pale brown. Legs dark brown; base of femora and a small patch just after the dark base of the tibiæ ochreous. Venter of thorax slaty-grey, of abdomen brownish-grey. Rostrum greyish. Wings smoky grey; costa and stigma dark grey. The ground colour of rubbed specimens brown. Antennæ a little shorter to same length as head and thorax; segment i. and ii. about equal; iii. longest, but not so long as iv. + v., with 6-8 large and 2-4 small sensoria, the latter towards

the base ; iv. a little longer than v., sensoria 0-1, the 1 usually near base ; vi. about three-quarters of v. ; all the segments with rather long hairs. Rostrum reaches well past third coxæ, acuminate. Body hairs arise mostly from black spots. Legs rather thick ; very hairy.

Length 2.8 to 3 mm.

Apterous viviparous female. Ground colour when rubbed pale bronzy brown, but when fresh more or less covered with greyish-brown tomentum ; there is a dorsal line of small greyish white spots continued to the region of the cornicles, which are black ; area between the cornicles rather dark and extends to a curved

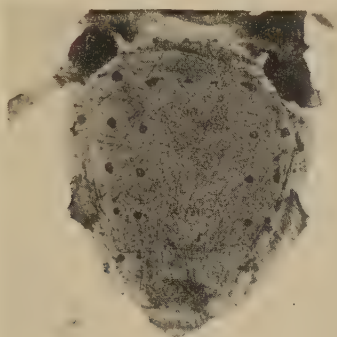


Fig. 66.—*Panimerus pinihabitans* Mordwilko.
Apterous viviparous ♀.

line immediately behind which is the commencement of a broad patch of whitish tomentum that extends to the cauda ; on the sides of the middle of the abdomen is some marbling of whitish-grey tomentum, which ceases at the cornicles, where there is a transverse band of bronzy-brown ground colour. Venter of abdomen pale brownish-grey, due to tomentum. Legs pale dull ochreous, distal end of femora brown, also of tibiæ ; tarsi dark brown. Antennæ ochreous, apices dark brown. Rostrum brownish at apex. Antennæ about as long as head and thorax, rather thin ; segment i. thicker than ii., about the same length ; iii. longest, slightly longer than iv. + v. ; iv. just about as long as v., with 1 sensorium near apex ; v. with 1 + 1 ; vi. short, more than

one-half of v. ; hairs pale, scanty, moderately long, 13-15 one side of iii., 6-7 the other, and some on surface, a few on iv. and v. and 3 on vi. Rostrum long, acuminate, reaching just past third coxæ. Cornicles dark, cone shaped, with few hairs. Body hairs numerous, fine, rather short. A few dark glandular spots on abdomen. Legs with dense rather long fine hairs.

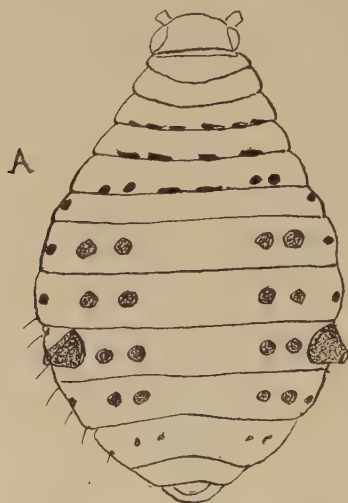


Fig. 67.—*Panimerus pinihabitans* Mordwilko.
Apterous ♀.

Male. Alate. Antennæ as long as or a little longer than head and thorax ; segments i. and ii. about equal ; iii. longest, longer than iv. + v., with 58-62 small sensoria all over it ; iv. about as long as v., with 15-19 sensoria ; v. with 7-10 sensoria ; vi. about three-quarters of v. ; all the segments with a few rather long fine hairs. Rostrum reaches past third coxæ. Body with moderately long hairs and small dark spots. Cauda dark. Penis dark. Legs dark ; femora pale at base ; tibiæ pale in middle ; hairy ; hairs rather long and fine. Stigma and stigmatic veins brown.

Length 3 mm.

FOOD PLANTS. *Pinus sylvestris* ; *Picea excelsa* ; *Larix decidua*.

LOCALITIES. Southgate, 2 ix. 47 ♂ and apt. ♀♀ (Walker) ; Brixton, 7 viii. 47 (Walker) ; Wye and Charing, very abundant ;

Kennington, near Wye, vii. 04 ; East Peckham, vii. 06 ; Pluckley, vi. 26 ; Kew, 10 v. 13 ; Oxford, vi. 11 ; Guildford, viii. 09 ; Woking, vii. 10 ; Chagford, Devon, viii. 12 ; Bournemouth, viii. 14 ; York, viii. 12 (F.V.T.) ; Streatley, 9 vi. 12 ; Great Salkeld, 3 vi. 11 and 6 v. 13 (Britten) ; Windermere, 13 v. 15 (R. Roberts) ; Rother, Morayshire, 28 ix. 17 ; Swordale, 1922 (Jackson) ; Rathdrum, Ireland, 22 v. 13 (Henry).

Observations. Walker's and Buckton's *pinicolus* Kalt., is not that species, but *pinihabitanus*. Miss Jackson found it on a Scots Fir, several of the smaller twigs being literally clothed with the aphides ; they were present only on the small bare branches which they had completely covered all round for about 7 inches. A large reddish-orange Lady Bird beetle was crawling amongst one colony. The aphides so closely resemble the grey colour of the bark of the twigs that they are noticed with difficulty. The colonies Miss Jackson found at Swordale in June, 1922, were attended by the ant *Lasius fusca*. The larvæ are pale bronzy-brown to pinkish brown, with less tomentum than the adults. A nymph had the thorax pale ochreous brown, also the abdomen ; wingcases blackish brown ; legs rather paler than in apterous female and two rows of very small black sub-dorsal dots on the abdomen, which is slightly hairy. Another nymph had the general colour of the abdomen greyish bronzy-brown ; thorax pinkish-brown.

PANIMERUS LARICIS Walker.

Aphis laricis Walker.

Lachnus laricis Van der Goot.

Lachniella laricis Jackson.

Lachnus muravensis Arnhart.

? *Lachniella nigrotuberculata* Del Guercio.

Walker, Ann. Nat. Hist., Se.2, II., 102, 39 (1848) ; List Homop. (B.M.), IV., 957, 40 (1852) ; Cholodkovsky, Horæ Soc. Ent. Ross., XXXI., 666 (1898) ; Schouteden, Mem. Soc. Ent. Belg., XII., 203, 5 (1906) ; Del Guercio, Redia V., 306, T. XVI., figs. 186-194 (1908) ; Van der Goot, Beit. z. Kennt. Holland. Blattläuse, 399 (1915) ; Theobald, Entomologist, XLIX., 184 (1916) ; Jackson, Scott. Nat., 164 (1919) ; Swain, Ent. News, Phil., XXXII., 213 (1921). Arnhart, Z. Angew. Ent., XII., 465-472 (1928).

Alate viviparous female. Dark brown to almost black, with white and grey tomentum, sometimes all over, at others only in patches, giving the insect a greyish-black appearance; venter of abdomen dark brown, also with grey tomentum; venter of thorax black, with little tomentum; antennæ pale translucent yellow to yellow, basal segment black; apices of iii. to v. black; vi. dark brown; in some the antennæ are a darker colour all over. Legs pale ochreous; coxæ deep brown; trochanters black; femora dark on apical half; tibiæ black at base, apex deep brown; tarsi dark, hairy. Rostrum black, paler at base. Antennæ shorter than head

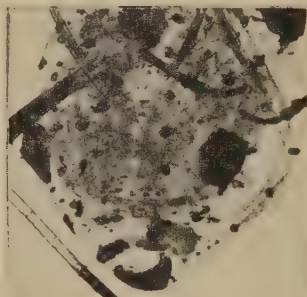


Fig. 68.—*Panimerus laricis* Walker.
Alate viviparous ♀.

and thorax; segment iii. longest, as long as iv. + v., with 9-10 round sensoria, those on the pale area often very faint, iv. less than one-half of iii. and shorter than v., with 2 sensoria; v. with a single sensorium below the large primary one; vi. small, less than one-half of v.; hairs rather short and faint. Rostrum long, acuminate, reaching past third coxæ. Cornicles on rather large flat cones, dark in colour, with many hairs. Legs rather long, with moderately long pale hairs, coxæ dark, the black base of tibiæ very marked. Body with large dark spots at the sides, smaller ones in the middle. Stigma deep brown.

Length 3 to 3.8 mm.

Apterous viviparous female. Deep chocolate brown to blackish brown, with pale grey spots and markings of varied sizes, some white; many black tubercles; venter pale grey. Antennæ pale yellow to tawny yellow, with black basal segment; dusky apices

to iii., iv. and v. and vi. all dark. Legs pale greyish-yellow to pale tawny yellow; coxæ black; trochanters paler in colour; femora brown except at the base; tibiæ with a marked black patch at the base, the apices brown; tarsi brown. Rostrum black, the



Fig. 69.—*Panimerus laricis* Walker.
Apterous viviparous ♀.

base pale. Antennæ as long as the head and thorax; the dark basal segment wider but not quite so long as ii.; iii. the longest, not quite so long as iv. + v.; iv. a little shorter than v.; vi. very small, about one-third of v.; hairs faint and rather short. The rostrum reaches well past the third coxæ. Abdomen with very numerous large and small dark patches from each of which arises one or more hairs.

Length 3 to 3.2 mm.

Walker describes three varieties: (1) Greenish-brown; head reddish. (2) Body brown; head red; tips only of thighs black; hind shanks black from middle to tips. (3) Brown mottled with black and white. Miss Jackson found that those at Swordale varied considerably, from pale grey to pale fawn, giving the aphides either a dark grey but more usually a brownish-black appearance. The alate ♀♀ also varied, being black, more or less covered with grey tomentum; abdomen sepia brown, sides with grey tomentum and so appearing paler with a dorsal line of white tomentum which intersects on each of the 4 middle segments a short transverse bar of white tomentum.

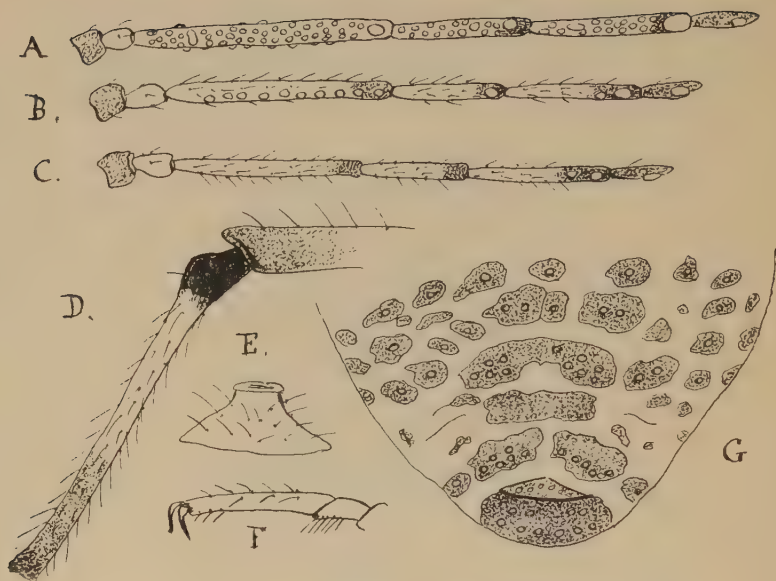


Fig. 70.—*Panimerus laricis* Walker.

A. Male antenna ; B. Alate ♀ antenna ; C. Apterous ♀ antenna ; D. Hind tibia of apterous ♀ ; E. Cornicle ; F. Hind tarsus of apterous ♀ ; G. Body markings.

Male. Alate. Antennæ a little longer than head and thorax ; segment i. wider than ii. ; iii. longest, not so long as iv. + v., with 47-55 sensoria, all over it, one to three larger than others ; iv. more than half iii., with 16-18 sensoria of unequal size ; iv. shorter than v., which has 17 to 18 unequal sized sensoria + 1 large primary ; vi. less than half v. Rostrum to third coxæ.

Length 2.5 mm.

FOOD PLANTS. *Larix decidua*, *L. sibirica*, *L. leptolassa*.

LOCALITIES. Bishop's Wood, Windermere, 16 viii. 13 ♂ and 14 vi. 14 (Rymer Roberts) ; Wye, 10 vi. 15 and vi. 28 (F.V.T.) ; 28 vi. 17 (D. Jackson) ; Southgate, 22 vi. and 25 viii. 47 (Walker) ; Kew Gardens (Laing) ; Swordale, N.B., 28 vii. 17 (D. Jackson) ; Brussels (Schouteden) ; Holland (V. d. Goot).

Observations. Apparently uncommon. Occurs on the main stem of the Larch, at the axils of the lateral branches and also on the lower branches; they rest along the branch, particularly against the greyish-brown knots that bear the needles; their colour harmonising so well that they may easily be overlooked. I have found the alate females now and then amongst the needles. The numerous black areas on the apterous viviparous females' abdomen and the jet black bases to the tibiæ are very characteristic. The young are brown above and below, the dark tubercles being very pronounced on the dorsum and they show no grey tomentum; the legs and antennæ pale translucent grey. Walker described the oviparous female as follows: "Larger than the viviparous female, the abdomen is at least thrice the breadth of the head or the fore chest; the body is light brown and has a very slight metallic tinge; the head and fore-chest somewhat darker than the rest of the body; there are three lines of black dots and two large transverse black, velvet-like spots on each side of the abdomen; feelers yellow, black towards the tips, less than one-third the length of the body; fifth joint much longer than fourth; sixth much less than half of fifth. Mouth black, dull yellow towards the base, reaches the hind hips and is much less than half the length of the body; legs yellow; thighs darker towards the tips; hips, knees and tips of shanks black. First var., Body dark brown; tips of joints and feelers black; legs darker and much longer than those of the viviparous ♀; base only of shanks yellow. Length $1\frac{1}{2}$ -3 lines. Wings $2\frac{1}{2}$ lines."

Schouteden also describes the oviparous female and the eggs (pp. 203-204).

The insect I recorded as *Lachniella nigrotuberculata* Del Guercio (Entomologist, XLIX, 184, 1916) is Walker's *laricis*, the specimens taken by Rymer Roberts at Bishop's Wood, Windermere, on *Larix leptolassa*.

It answered to Del Guercio's description and in consequence I think his species must sink under *laricis*, in spite of the more pronounced cornicles.

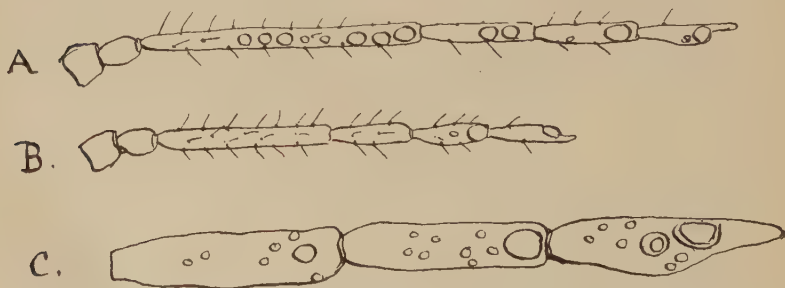
Laing (Entomo., LXI., 208, 1928) says that *muravensis* Arnhart is very close to Walker's *laricis*, the only difference is that the antennal setæ are a little shorter and stouter than in *laricis*. At most it is a variety of that species.

PANIMERUS PICTÆ Mordwilko.

Lachnus pictæ Mordwilko.*Lachniella pictæ* Jackson.

Mordwilko, Rab. Lab. Zool. Kab. Varch. Unw. (K. Fauné i Anal. sem. Aphidæ), 104, (1894); Mordwilko, Zool. Anz., 103 (1895); Cholodkovsky, Horae. Soc. Ent. Ross., XXXI., 665 (1898); Jackson, Scott. Nat. Soc., 164 (1919); Van der Goot, Beit z. Kennt. Holl. Blattläuse, 303 (1915).

Alate viviparous female. Head and thorax brownish-black; abdomen entirely green, with a faint yellowish-green dorsal line; eyes dark red; venter of body paler green, due to close white tomentum; venter of thorax brownish-black with slight covering of tomentum; rostrum pale olive, ochreous at base, dark brown at the tip; legs pale greenish ochreous, the distal part of femora, base of tibiæ and tips brown; tarsi brown; antennæ (very short) ochreous, with four dark brown bands. Antennæ very thin, much shorter than head and thorax; segments i. and ii. about equal; iii. longest, not quite so long as iv. + v. + vi., with 6 to 8 round irregular-sized sensoria, the apical three largest; iv., v. and vi. about equal; iv. with 2 sensoria; v. with a large primary; vi. with large primary, a group of 6 small and 1 large secondary near it; a few moderately long hairs on iii. to vi. Eyes large. Rostrum acuminate, rather thick, reaches to third coxæ. Cornicles on slightly elevated cones, with rings of short hairs. Femora with fine short hairs; tibiæ with many short fine hairs and on one side long spine-like outstanding ones. Head with long hairs. Body

Fig. 71.—*Panimerus pictæ* Mordwilko.

A. Antenna of alate ♀; B. of apterous ♀; C. Last three segments of larval antenna.

with dense long and short hairs, many arising from small dark bases, with very small dark spots in 2-3 longitudinal lines.

Length 3 to 3.2 mm.

Apterous viviparous female. Deep dark green dorsally, venter whitish-green; due to tomentum; head brownish, dusted with grey tomentum. Eyes red. Dorsum of first thoracic segment same colour as the head; rest of thorax greener; sides of the thoracic segments dark greyish-brown, dusted with pale tomentum; the abdomen with small black dots and a broad yellowish-green dorsal line; on either side is an irregular line of grey tomentum. Cornicles edged at base with a narrow dark ring; legs pale ochreous-green; tibiae tinged with pale ochreous brown; tarsi brown. Rostrum pale at base, dark brown at apex. Antennae pale ochreous, with 3 dark brown rings and dark apex, shorter than the head and thorax; segment iii. longest, equal to iv. + v.; iv. a little shorter than v.; v. and vi. equal; numerous moderate hairs; primary



Fig. 72.—*Panimerus pichtæ* Mordwilko.
Apterous viviparous ♀.

sensoria on v. and vi. normal. Rostrum to third coxæ, acuminate. Legs moderately long and thick, with short, dark hairs. Body with many small dark spots and many hairs of varied length.

Length 3.5 mm.

Nymph. Smaller than apterous female; body green. Head with grey tomentum and minute black dots. Thorax a little paler than the body, with a few minute black dots, each bearing a bristle; the abdomen with a complete dusting of minute black

dots, each carrying a hair and with faint yellowish-green dorsal and sub-dorsal lines ; wing pads blackish ; cornicles with a faint dark ring round the opening ; eyes red ; antennæ ochreous with three brown bands and brown apex ; legs pale greenish-ochreous to pale olive brown ; tarsi dark. Venter very pale green due to whitish tomentum ; rostrum pale at base, olive brown at apex.

Larvæ. Pale green with minute black spots ; antennæ thicker than in adult ; iv., v. and vi. with small secondary sensoria.

FOOD PLANTS. Silver Fir (*Abies pectinata*).

LOCALITIES. Rothes, Morayshire, 26 ix. 20 (Jackson) ; Russia (Mordwilko) ; Holland (Van der Goot).

Observations. Found by Miss D. Jackson on some old Silver Firs, never in abundance. They occurred solitarily on the terminal shoots at the base of the needles, feeding in a slanting position. Now and then two might occur at different positions on the same twig, but never in colonies. Their colour harmonises exactly with that of the needles, the green being of the identical shade and the silvery green under surface of their bodies being the same colour as the silver stripes on the under surfaces of the needles. Van Der Goot describes the winged male : " Head and thorax black ; abdomen grass green, with 3 bright green stripes, brownish spots and very short hairs ; antennæ and legs black ; cornicles green and brown ; antennal segment iii. with 65, iv. with 14 : v. with 14 + 1 and vi. with 5 + 1 sensoria."

~~PANIMERUS~~ CILICICA Del Guercio.

Lachniella cilicica Del Guercio.

Del Guercio, Redia, V., 297, Tav. XV., figs. 162-171 ; XVI., fig. 172 ; XX., fig. 284 (1908) ; Jackson, Scott. Nat., 164 (1919).

Apterous viviparous female. Dark shiny bronze ; on the thoracic and anterior abdominal segments is a narrow whitish dorsal line, on either side of which on the thorax is a thick black band which reaches to the abdomen where each line widens apart and is indicated by a black spot on each segment to the end of the body ; abdomen with many flecks of close white tomentum, both on the back and sides and these more or less arrange themselves into transverse lines on the sides beneath the black spots at the segmented rings. Cornicles blackish brown ; the white flecks

most abundant behind the cornicles. Antennæ ochreous, with 4 dark brown spots. Legs dark brown; base of femora ochreous. Venter grey. Rostrum pale brown, apex dark. In some of the



Fig. 73.
Panimerus cilicica Del Guercio.
Apterous ♀.



Fig. 74.
Panimerus cilicica Del Guercio.
Alate ♀.

smaller specimens there is a yellowish patch on the dorsum of the abdomen anteriorly between the rows of black spots. Antennæ not quite so long as head and thorax; segment i. larger than ii.;

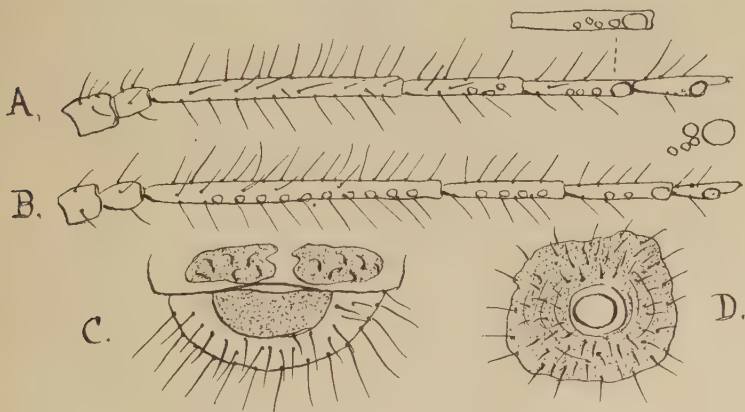


Fig. 75.—*Panimerus cilicica* Del Guercio.
A. Apterous ♀ antenna; B. Alate ♀ antenna; C. Apex of body;
D. Cornicle.

iii. longest, about as long as iv. + v. ; iv. and v. nearly equal, or iv. slightly longer than v. ; iv. with 0-3 sensoria on apical half ; v. with 0-3 + 1 ; vi. about four-fifths of v. ; all the segments with long outstanding hairs ; apices of iii. to v. dark. Head rounded in front, with long hairs. Rostrum long, acuminate, reaching well past third coxæ, nearly to the cornicles. Cornicles on large cones with many long hairs. Legs rather long and moderately thick ; fore and mid femora with a dark patch before the apex ; hind with the dark area extending up to the apex ; tibiæ pale just at base, the actual base very dark ; femora and tibiæ with very long outstanding tawny hairs. Abdomen with numerous hairs. and 2 sub-median rows of black spots, anterior ones largest ; 2 dark posterior patches and dark cauda and anal plate, also small dark spots and glands ; spiracular areas dark.

Length 3.8 to 4.3 mm.

Alate viviparous female. Segment iii. of antennæ with a line of 10 sensoria one side, as long as iv. + v. + vi. ; iv. and v. about equal ; iv. with 0-4 sensoria ; v. with 0 + 1 to 2 + 1 ; vi. about half of v. ; all the segments with long hairs.

Nymph. Head deep velvety red, with a whitish dorsal line ; eyes black, edged with a white line on the inner side ; pronotum of the same colour, with a widening white dorsal line and a broader white sub-dorsal stripe ; meso- and meta-thorax dark brown, with a narrow white dorsal line. Abdomen as in apterous female. Legs deep ochreous ; tarsi brown. Rostrum brown, reaching almost to the tip of abdomen. Venter with dusting of fine whitish grey tomentum. Antennæ as in apterous female.

FOOD PLANTS. *Abies pectinata* ; *A. nobilis* ; *A. grandis* ; *A. cilicica* ; *Pinus sylvestris*. *Cupressus* sp.

LOCALITIES. Glen of Rothes, Rothes, Morayshire, 26 ix. 17 ; Beaully, Inverness-shire, 25 ix. 18 (D. Jackson) ; Elgin, Pitgaveny, 12 vi. 23 (Staples) ; Rathdrum, Ireland, 2 vi. 13 ; Black Isle, Cromarty, 19 x. 1908 (W. R. Ogilvie Grant) ; Wisley, Surrey (G. Fox Wilson) ; Italy (Del Guercio).

Observations. Miss Jackson found this species on the Silver Fir in Scotland, a large number of apteræ and larvæ on the stem of one of the old branches ; the insects were adhering to the rind on the under side of the branches, packed in a dense mass an inch

square. At Beauily she found it on a young Silver Fir. The young are more elongate than the adults, pale brown with similar dark markings. There is some difference in the sensoria of the apteræ from Del Guercio's figure, but in the specimens I have they vary in number. This insect was identified for Miss Jackson by Dr. Wilson of the United States.

PANIMERUS PINI Linn.

N

Aphis nudi-pini De Geer.

Aphis pini Linnæus.

Lachnus pini Kaltenbach.

Lachnus nudus Mordwilko.

Pityaphis Amyot.

Eulachnus nudus Del Guercio.

Lachniella pini Jackson.

De Geer, Mem. p. s. l'hist. d. Ins., III., 27, t. 6, fig. 2 (1773); Linnæus, Syst. Nat., 10th Ed., 453, 21 (1758); Boyer, Ann. Soc. Ent., Fr. X., 186, 28 (1841); Hartig, Germ. Zeit., III., 368 (1841);



Fig. 76.—*Panimerus pini* Linnæus.
Alate viviparous ♀.

Kaltenbach, Mono. Pflanz., I., 155 (1843); Amyot, Ann. Soc. Ent. Fr., 2se, 481 (1847); Koch, Die Pflanz., 234, pl. XLII., figs. 308-310 (1857); Cholodkovsky, Horæ. Soc. Ent. Ross., XXXI., 642 (1898); Schouteden, Mem. Soc. Ent. Belg., XII., 205 (1906); Del Guercio,

Redia, V., 339, T. XX., figs. 278-282 (1908); Jackson. Scott. Nat. Sep., 1919, 165.

Alate viviparous female. Head black. Thorax dark brown to black, with white tomentum and a few hairs; abdomen tawny to brownish, some bright brown; shiny, with white tomentum in bars and lateral spots. Eyes brown. Antennæ dark; segment iii. dull yellowish. Rostrum yellowish-green, apex dark. Legs dark, mid tibiæ and base of femora yellowish, with long hairs. Cornicles brown to black. Head and thorax with dark punctures. Antennæ as long as head and thorax; segment i. not quite so long as ii.; iii. longest, about as long as iv. + v., with 7 to 9 small round sensoria; iv. slightly longer than v.; vi. about $\frac{3}{4}$ of v. Rostrum to or just past third coxæ. All parts hairy. Wings large; stigma and costa brown.

Length 3.8 to 4 mm.

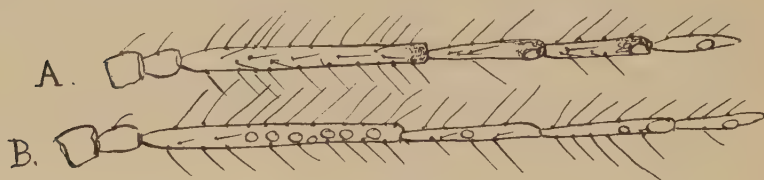


Fig. 77.—*Panimerus pini* Linnæus.
A. Antenna of apterous ♀; B. of alate ♀.

Apterous viviparous female. Various shades of reddish-brown to brownish-grey, with darker patches, especially in front and at the caudal end, with pale cross bars and small dark specks. Head and thorax with dark punctures, both dark coloured. Antennæ dark at base and apex, middle region yellowish to pale ashy brown. Legs yellowish-red to pale grey or drab; apices of femora and tibiæ and the tarsi dark. Whole body with tawny hairs. Eyes dark brown. Cornicles dark brown. Antennæ narrow, not so long as head and thorax; segments i. and ii. equal, iii. longest, about equal to iv. + v.; iv. longer than v.; vi. equal to three-quarters of v. Rostrum pale yellowish, apex dark, reaching to or past third coxæ. The body hairs mainly arise from the black spots; those on head and cauda moderate. The small dark spots in cleared specimens are characteristic, especially 2 small broad ones behind the cornicles (*vide* figure 78).

Length. 3.5 to 4 mm.

Male. Alate. Antennæ as long as head and thorax ; segment i. and ii. equal ; iii. longest, equal to iv. + v., with 44 to 50 sensoria ; v. with 6 to 8 ; vi. about half v. Rostrum reaches well past third coxæ. Hairs long. Cornicles rather pale.

FOOD PLANTS. *Pinus sylvestris* ; *P. cembra* ; *P. ponderosa* ; *P. halepensis* ; *P. scopulorum* ; *Larix decidua*.

LOCALITIES. Southgate, 3 vii. 47 ; 9 ix. 47 (Walker) ; Haslemere (Buckton) ; Wye, vi. 24 ; ix. 26 ; Hothfield, 7 viii. 25 ;



Fig. 78.—*Panimerus pini* De Geer.
Apterous viviparous ♀.

Crundale, vii. 18 ; Bournemouth, viii. 11 ; Exeter, viii. 09 ; Barmouth, N. Wales, viii. 10 (F.V.T.) ; Oxshott, 26 vi. 23 (Richards) ; Woking, 20 v. 12 (F.V.T.) ; Windermere, 15 vi. 12 (Rymer Roberts) ; Scotland (Evans) ; Kew, Bagshot, New Forest, Lynmouth ; Inverliever, Argyllshire, various localities throughout N.E. Scotland, Nr. Aberdeen, Kircardineshire, vii. and viii. 19 (Laing) ; Belgium (Schouteden) ; Germany ; Russia (Mordwilko) ; Italy (Del Guercio) ; Interlaken, vii. 89, Switzerland (F.V.T.) ; Odde, Norway, viii. 92 (F.V.T.).

Observations. A common species on Pines. The body spotting of the apteræ somewhat variable, but the two characteristic marks posteriorly shown in figure 78 of a cleared specimen are very constant. I found it swarming at Odde in Norway on many pines.

PANIMERUS CUPRESSI Buckton.

Lachnus cupressi Buckton.*Dilachnus cupressi* Swain.

Buckton, Mono. Brit. Aphid., III., 46, pl. CII., figs. 1-3 (1881);
 Cholodkovsky, Horæ. Soc. Ent. Ross., XXXI., 669 (1898);
 Swain, Ent. News, Phil., XXXII., 221 (1921).

Apterous viviparous female. Various shades of pale brown to brownish-yellow; eyes and cornicles deep shiny brown to black; antennæ and legs same colour as body, the former dark at apices, also the femora and tibiæ; tarsi dark; body, legs and head hairy; the body with small black spots. Antennæ shorter than head and thorax; segment i. a little wider than ii.; iii. the longest, a little longer than iv. + v.; iv. slightly shorter than v., with 1-2

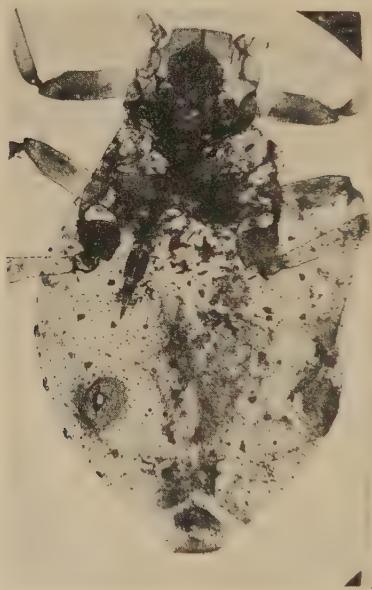


Fig. 79.—*Panimerus cupressi* Buckton.
 Apterous viviparous ♀.

small round sensoria near apex; vi. a little shorter than v. about equal to iv.; primary sensorium on v. large and one smaller one below; all the segments with long, thin, outstanding hairs. Head

broad, flat in front, with long hairs. Abdomen with rows of small dark spots and covered with short hairs. Rostrum long, very acuminate, reaching well past the third coxæ. Cornicles on wide, hairy cones. Legs moderately long, rather thick, with many thin, pale, outstanding hairs. Apex of body darkened.

Length 2 to 2.2 mm.

Alate viviparous female. Various shades of pale brown to yellowish-brown; head, thoracic lobes, cornicles, apices of femora, tibiæ and antennæ brown; tarsi brown; hind legs long; body very hairy.

Length 3.91 mm.

FOOD PLANTS. *Cupressus macrocarpus*.

LOCALITIES. Wisley, 20 ix. 23 (Fox Wilson); Probus, Cornwall (Buckton), 1879.

Observations. This species was described by Buckton from specimens sent him through Mr. McLachlan by the Hon. J. T. Boscawen, of Lamorran, Probus, Cornwall. They were described as doing considerable injury to the cypresses of the neighbourhood, towards the end of the year 1879.

The specimens sent me from Wisley were all apteræ and were apparently very numerous on *Cupressus macrocarpus*. Buckton describes the pupa as: "Oval, domed, shining yellowish-brown, hirsute. Wing cases honey-yellow."

~~PANIMERUS~~ JUNIPERI De Geer.

Aphis juniperi De Geer, Fabricius, Schrank.

Lachnus juniperi Kaltenbach.

Juniperifex Amyot.

Lachniella juniperi Del Guercio.

Dilachnus juniperi Swain.

De Geer, Mém. p. serv. hist. Ins., 56 (1773); Fabricius, Ent. Syst., IV., 218, 40 (1775); Syst. Rhyng., 300, 40 (1822); Schrank, Fn. Boica, II., 1, 119, 120 (1801); Kaltenbach, Mono. Pflanz., 158 (1843); Koch, Die Pflanz., 243, 7, pl. 44, figs. 319-321 (1855); Walker, Ann. Nat. Hist. 2 Se. II., 103, 40 (1848); List Homop. (B.M.), 958 (1852); Amyot, Ann. Soc. Ent. Fr., 2 se. V., 481 (1872); Cholodkovsky, Horæ. Soc. Ent. Ross., XXXI., 667 (1898); Buckton, Mono. Brit. Aphid., III., 44, pl. XCVI., figs. 1, 2 (1881);

Schouteden, Mem. Soc. Ent. Belg., XII., 203, 3 (1906); Del Guercio, Redia, V., 312, pl. XVII., figs. 208-215 (1908); Essig, Pomona. Journ., Ent. I., 541 (1911); Rymer Roberts, Lanc. and Chesh. Nat., 278 (1915); Jackson, Scottish Nat., Sep., 164 (1919); Swain, Ent. News, Phil., XXXIII., 213 (1921); Van der Goot, Beit. z. Kennt. d. Holl. Blattläuse, 396 (1915).

Alate viviparous female. Head and thorax shiny black; abdomen reddish-brown; antennæ dark; legs dark; eyes and rostrum black; dark spots on body; stigmata black; cornicles black, arising from black patches; hairy; wings brownish; cubitus and insertions yellow; stigma brown. Antennæ as long as head

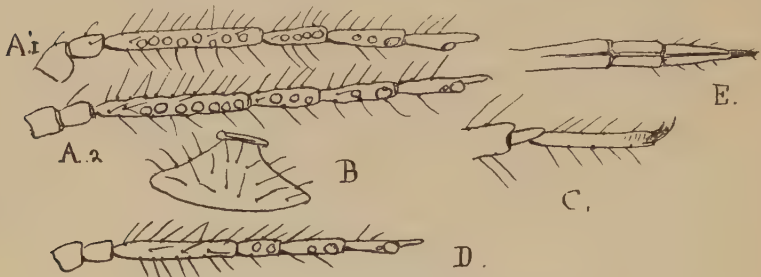


Fig. 80.—*Panimerus juniperi* De Geer.

A.1. and A.2. Alate ♀ antennæ; B. Cornicle; C. Hind tarsus; D. Apterous ♀ antenna; E. Apex of rostrum.

and thorax; segments i. and ii. equal; iii. longest, about as long as iv. + v., with 5-4 round sensoria along one side; iv. not quite so long as v., with 2-3 sensoria; v. with 0-2 + 1; vi. about as long as v., primary sensorium large and 2 small sensoria near; nail short; hairs long. Rostrum reaches to the third coxæ, acuminate.

Length 2.4-2.7 mm.

Apterous viviparous female. Shades of sienna brown, somewhat shiny, pilose. Head and thorax and legs black. Abdomen rich brown with 2 large irregular dark spots upon which the dark cornicles arise. Antennæ and legs dark, almost black. Rostrum black. Venter reddish. Antennæ shorter than head and thorax; segment iii. longest, about as long as iv. + v.; iv. a little shorter than v., with 1 to 2 small sensoria; primary sensorium on v.

large, with 0-1 secondary ; hairs long. Rostrum reaches to third coxæ, acuminate. The dark legs are rather thick and hairy.

Length 2.5 to 2.7 mm.



Fig. 81.—*Panimerus juniperi* De Geer.
Apterous viviparous ♀.

FOOD PLANT. Junipers (*Juniperus communis*) and (*Juniperus virginiana*).

LOCALITIES. Southgate, 1 vi. 47 (Walker, in Dublin Museum) ; Alnwick and Wooler, in Northumberland (Buckton) ; Cheviot (Hardy) ; Ross-shire (Jackson) ; Pitlochry, ix. 12 (Duffield) ; Windermere, Westmorland (Rymer Roberts) ; Crundale, 7 v. 12 ; Wye Downs, v. and vi. 10-14 (F.V.T.) ; Kew Gardens ; Bledlow. Bucks. ; Mickleham Common, Surrey ; Boat of Garden, Inverness-shire (Laing) ; Germany (Kaltenbach, Koch) ; Italy (Del Guercio) ; Russia (Cholodkovsky) ; Brussels, Francorchamps (Schouteden) ; Holland (V. d. Goot).

Observations. Occasionally found swarming on the Common Juniper. Hardy found it on the black Cheviot moors and found the black eggs on the twigs in plenty. Kaltenbach was unable to find it in warm moist places. De Geer says the male is apterous ; I have been unable to find any sexuales. Koch and Buckton give the species as Fabricius, but De Geer described it two years before. It occurs rarely on the Downs at Wye, but in some years a good many isolated females may be found, but the colonies never become any size.

I originally identified this as Del Guercio's *juniperi-signata*. My specimens all agree with Walker's specimens in the British Museum and the Dublin Museum.

Van der Goot gives Buckton's *cupressi* as a synonym, it appears to me to be distinct. Van der Goot describes the wingless oviparous female and the alate male. The latter has 80 sensoria on segment iii. of the antennæ ; 20 on iv. ; 12 to 15 + 1 on v.

PANIMERUS HYALINUS Koch.

Lachnus hyalinus Koch.

Lachnus macrocephalus Buckton.

Lachniella hyalina Del Guercio.

Koch, Die Pflanz., 238, figs. 213, 314 (1855) ; Buckton, Mono. Brit. Aphid., III., 48, pl. XCVII., figs. 1 and 2 (1881) ; Cholodkovsky, Horæ. Soc. Ent. Ross., XXXI., 663 (1898) ; Del Guercio, Redia, V., 303, pl. XVI., figs. 177-183 (1908) ; Van der Goot, Beit z. Kennt. d. Holl. Blattläuse, 394 (1915).

Apterous viviparous female. Antennæ less than half body ; segment i. wider but no longer than ii. ; iii. longest, as long as iv. + v. ; iv. a little shorter than v. ; vi. a little shorter than v. ; " nail " very small ; all the segments with long hairs. Rostrum nearly as long as the body, narrow, acuminate. Eyes red. Cornicles, body and legs with long hairs. Brown, ferruginous or bright green ; very hairy. Abdomen with two double rows of black or brown punctures disposed longitudinally ; body with woolly tomentum, especially caudad.

Length 2 mm.

Male. Alate. Antennæ thin, shorter than body ; segments i. and ii. about equal ; iii. the longest, as long as iv. + v. + vi., with 32-38 sensoria ; iv. and v. equal ; iv. with 12 to 14 sensoria ; v. with 4-6 + 1 ; vi. not so long as v. ; nail small ; all the segments with rather long, thin hairs. Rostrum acuminate, reaching past third coxæ. Legs very hairy. Cornicles dark, hairy. Claspers dark. Penis yellow, narrow. Head and body hairy. Head and thorax brown. Abdomen shiny green with small black tubercles ; much white tomentum on body. Legs brown.

Length 2 to 2.5 mm.

FOOD PLANTS. *Picea excelsa* ; *Pinus sylvestris* ; and *P. austriaca*.

LOCALITIES. Southgate, 14 vii. 47 ; 16 viii. 47 (Walker in Dublin Museum) ; Walthamstow, vi. ; Bramshot, vii. (Buckton) ; Holland (V. d. Goot) ; Italy (Del Guercio) ; Germany (Koch).

Observations. I have never found this Lachnid and the description is made up from specimens of Walker's in the Dublin Museum and from Buckton's in the British Museum. Buckton considered his *Lachnus macrocephalus* as possibly being Koch's *hyalinus*.

PANIMERUS TUJÆ Del Guercio.

Lachniella tujæ Del Guercio.

Redia, v., 309, pl. XVII., figs. 195-203 (1908).

Apterous viviparous female. Flesh colour to pale cinnamon-brown ; three marked dark spots each side in front ; a black broad band between the cornicles and some small ones anterior to it ; with slight grey tomentum ; antennæ and legs much the

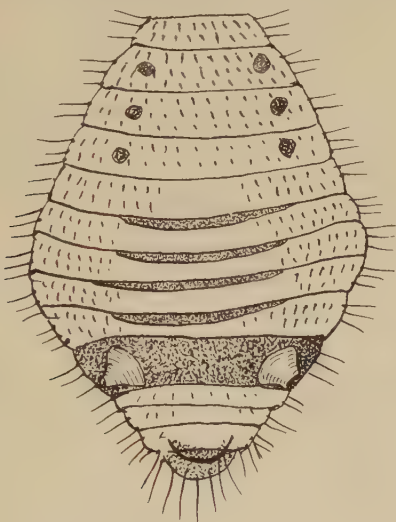


Fig. 82.—*Panimerus tujæ* Del Guercio.
Apterous viviparous ♀.

same colour as the body ; apices of antennal segments iii. to v. dark, and all vi. ; also apices of femora and tibiæ ; tarsi dark ; cornicles pale to dark brown. Antennæ shorter than head and

thorax ; segment iii. longest, longer than iv. + v. ; iv. with 1 to 2 round sensoria near apex ; v. with 1 small one below the primary ; vi. nearly equal to v. ; hairs long and outstanding.



Fig. 83.—*Panimerus tujæ* Del Guercio.

A. Head and antenna of apterous ♀ ; B. Cornicle ; C. Fore wing.

Rostrum thin, acuminate, reaching past third coxæ ; apex darkened. Cornicles on rather broad, hairy cones. Anal plate and cauda dark, with long dark hairs. Body hairs pale, very fine. Legs thick, moderately long, with many outstanding pale hairs. Eyes large, dark ; ocular process small.

Length 2 to 2.3 mm.

FOOD PLANTS. *Thuja occidentalis* and *Thuja* sp.

LOCALITIES. Bristol, 7 vii. 13 (F.V.T.) ; Italy (Del Guercio) ; Berlin, 20 ix. 13.

Observations. I only know of this species from one locality in this country. The specimens sent me were all apteræ and two nymphæ. The ocular process seems very small. The alate female is described by Del Guercio.

PANIMERUS VANDUZEI Swain.

Aphis piceæ Walker (non Panzer).

Lachnus piceæ Mordwilko, Walker.

Lachnus longipes Buckton.

Dilachnus piceæ Swain.

Lachnus vanduzei Swain.

Walker, Ann. Mag. Nat. Hist., II., Se. 2, 95 (1848) ; Buckton, Mono. Brit. Aph., III., 58 and 59 (1881) ; Cholodkovsky, Horæ. Soc. Ent. Ross., XXXI., 655 (1897) ; Schouteden, Mém. Soc. Ent. Belg., XII., 205 (1906) ; Theobald, Entomologist, XLVII., 104 (1914) ; Swain, Ent. News., Philad., XXXII., 225 (1921) ; Van der Goot, Beit. z. Kennt. Holl. Blattläus, 401 (1915).

Alate viviparous female. Black to dark brownish-black, smooth and shiny ; antennæ reddish-brown, apices dark ; eyes black ; rostrum dark ; legs black and reddish brown ; the femora are black at apices ; tibiæ of fore and mid legs dark on apical



Fig. 84.—*Panimerus vanduzeei* Swain.
Alate viviparous ♀.

half and the posterior only red at base ; wings tinged with brown, veins dark to pale brown. Antennal segment i. larger than ii. ; iii. very long with 10-14 round, large sensoria, extending along the whole length ; iv. about one-third of iii. with 2-3 round sensoria, the apical one largest ; v. much longer than iv., with 1-2 sensoria on apical half plus the large primary one ; vi. short. Rostrum long and acuminate, often reaching past the apex of the body.

Length 6 to 6.3 mm.

Apterous viviparous female. Black, brownish black below ; antennæ reddish-yellow, apices dark ; legs bright brown, apices

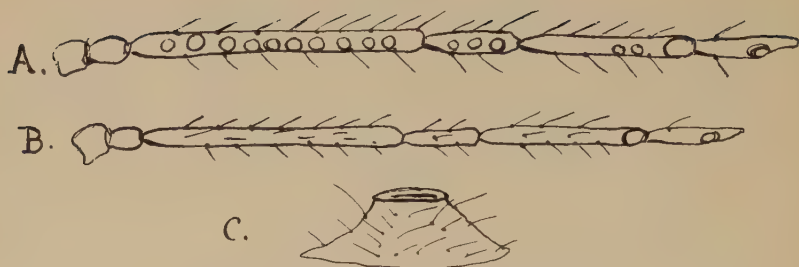


Fig. 85.—*Panimerus vanduzeei* Swain.

A. Antenna of Alate ♀. B. Of Apterous ♀. C. Cornicle.

of femora, tibiæ and the tarsi black, with short hairs; rather long, especially the hind pair. Antennæ about, to less than, half the length of the body; segment i. larger than ii.; iii. long, nearly as long as iv. + v. + vi.; iv. a little shorter than vi.; v. with a large primary sensorium and a smaller secondary one below it; vi. very small, nail minute. Cornicles black. Rostrum long, acuminate. Body with short hairs, but which are longer and dense at apex.

Length 6 to 6.5 mm.

FOOD PLANTS. *Picea excelsa*; *P. orientalis*; *P. alba*; *Abies pectinata*; *A. nordmanniana*.

LOCALITIES. Kennington, vii. 01 and viii. 06; 15 vi. 11; Wye, vii. 01; 4 vii. 06 (F.V.T.); Aberfeldy, 25 vii. 22 (Jackson); Avondale, Rathdrum, Ireland, 2 vi. 13; Westmorland; Penrith, Cumberland; Noran, Morayshire; Dumbartonshire; Kew Gardens (B.M. Coll.); Switzerland, in the Alps (Walker); Holland (Van der Goot); Germany (Panzer, Kaltenbach); Russia (Cholodkovsky); Scandinavia (Zetterstedt); Francorchamps, Belgium (Schouteden); Czechoslovakia.

Observations. One of the largest European aphides. Those I found at Kennington and Wye swarmed in great masses, a foot or more in length in 1901 and 1906, since then it has not been seen in the neighbourhood. It was noticed in 1901 that they all became alate about August 7th and in 1906 on August 20th. I have a badly damaged oviparous female apparently this species, taken at Granchester, Cambridge, in October.

Genus LACHNUS Burmeister.

Lachniella Del Guercio.

Burmeister, Handbuch, d. Ent. II., pt. 1, 91 (1835); Del Guercio, Redia, V., 286 (1909); Baker, Bull. 826, U.S. Dept. Agri., 15 (1920).

Fore wings with media once branched; radial sector short and straight; stigma elongate. Antennæ of 6 segments, with prominent hairs. Cornicles on rather shallow cones, hairy. Eyes with distinct ocular process. Rostrum long, thin, acuminate. This genus has *fasciatus* as type following Baker. In 1910 Wilson made Burmeister's *punctatus* the type. He now maintains that *punctatus* is *viminalis*. In 1911, Wilson made *fasciatus* the type, but according to the rules this cannot hold; in spite of this instead of losing this well-known generic name, *fasciatus* is here taken as the type and so the name is retained. Del Guercio's *Lachniella* (1909) falls as a synonym; he set no type to the genus.

The genus *Lachnus* is easily demarked by the simple media to the fore wings and by the lance-like narrow rostrum, from *Schizolachnus*, which has the rostrum obtuse.

LACHNUS COSTATUS Zetterstedt.

Aphis costata Zetterstedt.

Aphis fasciatus Burmeister.

Dryobius cistatus Buckton.

Lachniella fasciata Del Guercio.

Lachnus costatus (Zett) Jackson.

Zetterstedt, Fn. Ins. Lapp., I., 559 (1828); Burmeister, Hand. d. Ent., II., 93, 4 (1835); Curtis, Brit. Ent., 577 (1835); Zetterstedt, Ins. Lapp., II., 311 (1840); Kaltenbach, Mono. Pflanz., I., 160, 9 (1843); Walker, Ann. Nat. Hist., Se. 2, II., 100 (1848); Koch, Die Pflanz., 237, figs. 311, 312 (1855); Amyot, Ann. Soc. Ent. Fr., 2 se. V., 481 (1872); Del Guercio, Redia V., 294, pl. XV., figs. 152-161 (1908); Jackson, Scot. Nat., 164, (1917); Laing, Ent. Mo. Mag., LX., 245 (1923).

Alate viviparous female. Head brown with white meal; hairs long; pronotum brown with a pale band in front and behind; mesothorax black; scutellum mealy. Abdomen greyish-yellow to brown, with white meal; apex black. Eyes reddish; antennæ dull yellow to tawny; base black and apices of segments iii. to v.

Rostrum yellow, apex brown ; eyes deep red. Legs dirty yellowish-grey, apices of segments dark, tarsi dark, a small dark area at base of tibiae. Wings ornamented as shown in figure. Antennae shorter than head and thorax ; segments i. and ii. about equal ; iii. longest, as long as iv. + v., with 0-3 apical round sensoria, when 3 the apical largest ; iv. and v. about equal, or iv. shorter than v. ; iv. with 1 apical sensorium ; v. with 1 + 1 ; vi. a little shorter than v. ; all segments with long hairs. Rostrum long, very acuminate, hairy, reaching past third coxæ. Cornicles hairy. Body and legs very hairy ; hairs long.

Length 2.3 to 3 mm.

Apterous viviparous female. Deep reddish brown to blackish-brown, shiny and metallic ; head paler, often yellowish-brown ; body with 2 dark bands on thorax and traces of others on body and dark spots laterally ; some specimens dark in middle. Cauda and cornicles dark ; whole body covered with white tomentum, especially the venter. Legs yellowish to reddish-brown ; tarsi

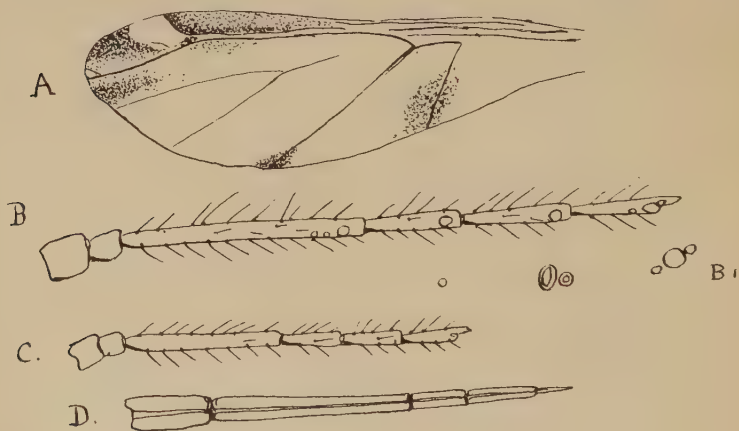


Fig. 86.—*Lachnus costatus* Zetterstedt.

A. and B. Wing and antenna of alate ♀ ; B.1. Sensoria on v. and vi. ; C. Antenna of apterous ♀ ; D. Rostrum. ♀

dark. Rostrum long, pale, apex dark. Antennae dark, yellow towards base ; hairy ; shorter than head and thorax to almost as long ; segment i. wider, but shorter than ii. ; iii. longest, about as long as iv. + v. ; iv. shorter than v., with a small apical sensorium ;

v. with a small secondary sensorium below the primary ; vi. shorter than v. to same length ; all from iii. to vi. with long hairs. Rostrum thin, acuminate, reaching well past third coxæ, hairy. Eyes red, large. Head and body hairy. Legs long, rather thick, very hairy. Cornicles large, hairy.

Length 2 to 2.5 mm.

Male. Alate. Head and thorax brownish-black ; eyes dark red ; abdomen ochreous, shaded dorsally with brown, with a tuft of white tomentum and pale hairs anteriorly and scattered flecks of tomentum at the sides ; some have the abdomen shaded with greenish-brown or yellowish-green shading to dull ochreous green on the back ; hairs numerous, pale ; antennæ brownish-ochreous ; legs ochreous, with apex of femora, base of tibiæ and the tarsi

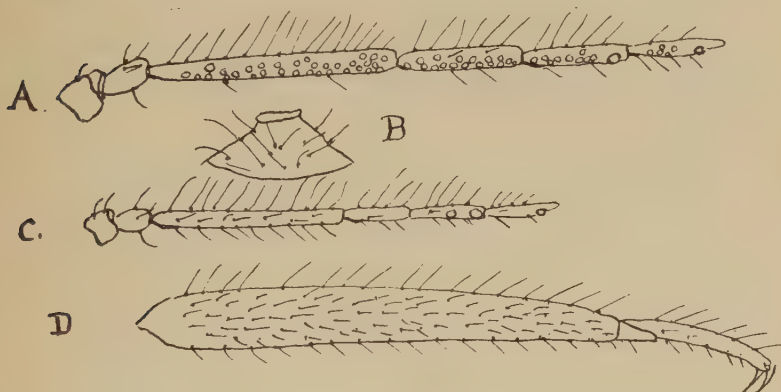


Fig. 87.—*Lachnus costatus* Zetterstedt

A. Antenna of ♂ ; B. Cornicle ; C. Antenna of oviparous ♀ ; D. Hind tibia of oviparous ♀.

brown. Rostrum pale, apex brown. Cornicles dusky. Wings marked as in alate female. Antennæ equal head and thorax in length ; segment ii. longer than i. ; iii. longest, nearly equal to iv. + v., with 35-40 sensoria ; iv. with 16-18 ; v. with 10-12 + 1, vi. about three-quarters of v., with 4-6 small sensoria on basal area, primary sensorium large, with 4 small secondaries ; hairs rather long and fine. Head with long hairs ; body with fine, shorter ones. Cornicles hairy. Rostrum reaches past third coxæ, very acuminate. Penis yellow ; claspers dark. Legs with many fine hairs.

Oviparous female. Apterous. Antennæ thin, shorter than head and thorax ; segment ii. larger than i. ; iii. longest, nearly equal to iv. + v. + vi. ; iv. a little shorter than v., 1 sensorium below the primary ; vi. equals v. ; hairs fine, long on one side, shorter on the other. Rostrum acuminate, reaching well past third coxæ. Head with long hairs. Body with many short hairs and small dark glandular spots each side ; spiracular areas dark. Cornicles dark and hairy. Legs rather short and thick ; long hairs on femora and tibiæ ; hind tibiæ darkened, broader than others, no signs of sensoria.

FOOD PLANTS. *Pinus sylvestris* ; *P. strobus* ; *Picea excelsa* ; *P. mariana* ; *Abies pectinata* and *A. nigra*.

LOCALITIES. Tunbridge Wells, vi. 14 ; Westwell, 4 vii. 14 ; Canterbury, 14 vi. 12 ; Wye, vi. 09-13 ; 7 vii. 26 (F.V.T.) ; Southgate, 10 vii. 47 (Walker) ; Windermere, 5 v. 13 (Rymer Roberts) ; Great Salkeld, 20 vi. 12 ; 20 vi. 14 (Britten) ; Beaulieu, N.B., 5 x. 17 (Jackson) ; Germany (Koch, etc.) ; Italy (Del Guercio).

Observations. Apparently not common. They occur both on the younger and older shoots alike. I have usually found only isolated specimens here and there. Miss Jackson records them at Beaulieu in October and they were not to be found on the healthy strong branches of the Spruce, but on the very old branches, situated farther in the tree, where the aphids occurred in colonies, but occasionally on the small twigs, but mostly on branches from $\frac{1}{4}$ to $\frac{1}{2}$ inch in diameter. Wherever the aphides were present the area of the branch occupied had a dusty whitish appearance due to the presence of tomentum. Alatae occur in June and July. Walker refers to this species as *costata* of Zetterstedt, but the latter is the same as *fasciatus*. Walker mentions a variety as follows : " Body brown, shining and mottled with grey and black down ; feelers nearly white, their tips brown ; nectaries black ; legs pale yellow ; feet and tips of thighs and of shanks and base of latter black."

Walker also describes the oviparous ♀ : " The body bronze colour, with a yellowish border ; the limbs are yellow ; feelers about half length of body ; tips of joints black ; nectaries black ; knees brown ; feet and tips of shanks black. The end of October is the season for egg laying."

With regards to this species Laing writes (Ent. Mo. Mag., LX., 245, 1923): "*Dryobius cistatus* (Walker) Buckton, Swain (Ent. News, XXXII., 211, 1921), says there are no specimens in the British Museum collection that could fit Buckton's description." Mr. Laing says there is a slide in the Buckton collection having Buckton's key letters and Walker's locality and determination label: "Spruce, Southgate, June 21, 47." The determination is intended for *costata*.

Genus SCHIZOLACHNUS Mordwilko.

Mordwilko, Ann. Mus. Zool. l'Acad. Imp. d Sc. St. Petersbourg, XIII., 375 (1908); Baker, Bull. 826, U.S. Dept. Agri., 16 (1920).

The media of forewings once branched; radial sector straight; stigma elongate. Antennæ of 6 segments; no secondary sensoria and rather prominent hairs. Labium obtuse. Eyes large with ocular process.

The type set by Mordwilko is De Geer's *Aphis tomentosus*, the *Aphis pineti* of Fabricius and the *Schizoneura fuliginosa* of Buckton.

SCHIZOLACHNUS TOMENTOSUS De Geer.

Aphis tomentosus De Geer.

Aphis pineti Fabricius.

Lachnus pineti Hartig.

Lachnus piniphila Ratzeburg.

Schizoneura fuliginosa Buckton.

Schizolachnus tomentosus Mordwilko.

Lachnus tomentosus Van der Goot.

Pinetifex Amyot.

De Geer, Mem. p. Serv. a l'hist., Ins., III., 39, T. 6, fig. 21-22 (1780); Fabricius, Ent. Syst., 219, 45 (1794); Syst. Rhyng., 309, 45 (1803); Zetterstedt, Ins. Lapp., I., 558, 2 (1828); Ins. Lapp., I., 310, 2 (1840); Hartig, Germ. Zeit., III., 368 (1841); Kaltenbach, Mono. Pflanz., 162 (1843); Ratzeburg, Die Forst. Ins., 219, 26, T. XI., fig. 5 (1844); Amyot, Am. Soc. Ent. Fr., 2se, V., 481 (1847); Buckton, Mono. Brit. Aph., III., 96 (1881); Mordwilko, Zool. Anz., 103 (1895); Cholodkovsky, Horæ. Soc. Ent., Ross., 635, 643 (1898); Mordwilko, Ann. Mus. Zool. d'Acad. Imp.

Sci., 375 (1908) ; Del Guercio, Redia, V., 283-286, T. XIV., figs. 125-135 (1908) ; Schouteden, Mem. Soc. Ent. Belg., XII., 207, 13 (1906) ; Van der Goot, Beit. z. Kennt d. Holland Blattläuse, 409 (1915) ; Swain, Ent. News, Phil., XXXII., 212 (1921).

Alate viviparous female. Black to deep brownish-black, very hairy and with some white meal on body ; antennæ dark ; legs black, base of femora and tibiæ slightly paler ; stigma and veins pale brown. Antennæ about as long as the head and thorax ; segments i. and ii. very dark ; i. wider than ii. ; iii. longest, nearly as long as iv. + v. + vi. with 3 to 6 round sensoria, with distinct darker contoured borders ; when 3 sensoria, they are close to base, when more, extending nearly to the apex of the segment ; iv. a little more than one-half of iii. and either a little longer or equal to v. ; primary sensorium apical and round ; vi. not nearly so long

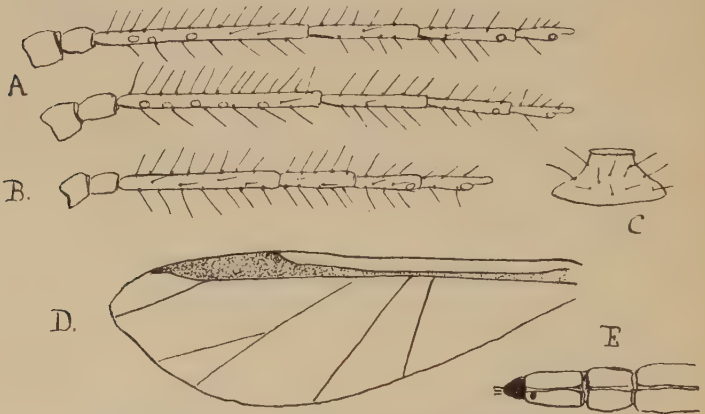


Fig. 88.—*Schizolachnus tomentosus* De Geer.

A. Alate ♀ antenna ; B. Apterous ♀ antenna ; C. Cornicle ; D. Wing (fore) ; E. Apex of rostrum.

as v. ; nail very small ; all the segments with long outstanding hairs. Head flat with long hairs, Eyes large, black. Cornicles, dark, on rather shallow cones, with a few long hairs. Body hairy. Legs long, especially hind pair, with dense long outstanding hairs. Rostrum reaches to between second and third coxæ, blunt. Sometimes the pale media is not forked.

Length 2 to 2.2 mm.

Apterous viviparous female. Deep black to dark reddish-brown, now and then dark olive-green, shiny, powdered with white meal giving a general grey appearance ; abdominal segmentation marked. Antennæ dusky grey, apex dark. Eyes and rostrum black. Body hairy. Venter with longer and looser grey tomentum. Antennæ about as long as head and thorax ; segments i. and ii. about equal ; iii. longest, about as long as iv. + v. ; iv. and v. equal ; vi. nearly as long as v. ; all segments very hairy. Rostrum dark, reaching to third coxæ, rather blunt ; last 2 segments about equal, apex black. Cornicles on rather low cones with a few scattered hairs. Legs rather long, especially the hind pair, very hairy. Body with long hairs. In cleared specimens a row of small brown spots on each side of the abdomen, above and below.

Length 1.7 to 1.9 mm.

FOOD PLANTS. *Pinus sylvestris*; *P. austriacus* ; *P. pyrenica* ; *P. laricio* var *nigricans* ; *P. pinaster*.

LOCALITIES. Wye, iv. to x. ; Godmersham, near Canterbury, 20 ix. 22 ; Hastings, 09 ; Oxshott Common, near Esher, vi. 84 ; vii. 87 ; Kew, vi. 07 ; Brockenhurst, New Forest, 15 viii. 15 ; Haslemere, vii. 08 (F.V.T.) ; Weycombe, Haslemere, v. to xii. (Buckton) ; Cambridge (Rymer Roberts) ; Crowborough, 25 v. 18 (D. Jackson) ; Ipswich (F.V.T.) ; Windermere, 2 vi. 14 (Rymer Roberts) ; Pitlochry, N.B., x. 10 (D. Jackson) ; Alness River, N.B., 31 viii. 17 (D. Jackson) ; Bagshot, Woking, Kew Gardens, Weybridge, Surrey ; Croxley Green, Herts. ; Bledlow, Bucks ; Midhurst, Sussex (Laing). Italy (Del Guercio) ; Belgium (Schouteden) ; Holland (Van der Goot) ; Lucerne, Switzerland, vii. 08 (F.V.T.) ; Bergen, Norway ; viii. 92 (F.V.T.). Hong Kong (Van der Goot).

Observations. A very common species where it occurs. The apteræ and nymphæ cluster in rows down the pine needles and are easily detected by the covering of fine white meal over their bodies and legs. When touched the insects wave their hind legs in the air in the usual Lachnid manner, but the action is more marked. The alatae are very sluggish and often occur as isolated individuals on the needles, sometimes a few together or amongst the colonies of apteræ. They are often much attended by ants. Buckton

found orange-coloured apterous males in November. I have not seen any sexuales. This true Lachnid was described by Buckton as a *Schizoneura*, under the name *fuliginosus*. Ratzeburg's *Lachnus piniphila* is undoubtedly the same species and so is Fabricius' *pineti*.

Sub-family IV. ERIOSOMATINÆ.

This sub-family has the cornicles very much reduced or even absent. Wax glands are abundantly developed. Antennal sensoria of the alatæ prominent. The wing veins are much reduced. The sexual stages are all small and arostrate, the oviparous females produce only one ovum or at the most two. Many of this sub-family are "gall-formers" others are root-feeders, and are closely connected with ants. The cornicles, in some such as the genus *Eriosoma* are represented by weak chitinous rings on very slightly elevated cones, in a few the cones are hairy. From these flattened cornicles a narrow tube leads to a large wax reservoir, from which mealy and flocculent matter is passed out. In others such as *Forda* and the ground forms of *Tetraneura* no such secretions occur. Many, such as the *Fordini*, are root feeders and now and then cause serious loss to cereal crops in parts of Central Europe.

In this sub-family we find many insects which produce true galls (*Pemphigini* and *Fordini*), that is abnormal formations of plant tissue which entirely enclose the insect or insects, such as we observe in the galls on *Populus* and *Pistachia*. In some cases the "Stem Mother" lives in the galls by herself, but in others subsequent generations live with her. The well-known Woolly Aphid of the apple (*Eriosoma lanigerum*) produces pseudo-galls on the wood and the Ash Tree *Prociphilus* masses of crumpled leaves forming nests. The Apple Woolly Aphid also forms pseudo-galls on apple roots. Some of these gall-formers, as seen on *Populus*, leave the galls in summer and live on the roots of plants, such as *Thecabius affinis* (Kaltenbach), which when away from the poplars lives and breeds on the roots and lower leaves of *Ranunculus*. The small Bladder Gall of Elms caused by *Tetraneura ulmifoliæ*, Baker, gives out aphides which are alate and these place their young on the roots of grasses, etc., where they live for a long time. One very noticeable feature in this group is the part played by

ants in their economy. Not only are the *Fordini* largely myrmecophilous, but we find *Tetraneura ulmifoliae* and some of the *Pemphigini* plentiful in ants' nests.

Perhaps the only truly myrmecophilous species is *Paracletus cimiciformis* (Heyden) when living in the soil. The species of *Forda*, *Geocica*, etc., may nearly always be found in ants' nests, where the ants undoubtedly tend them, with other plant lice such as *Anoecia corni*, but they also occur where no ants exist. I have never found *Eriosoma* connected with ants in this country, but Baker says that: "They carry the root generations of *Eriosoma* from one place to another and even distribute them about the trees." Indeed, the writer says he once took advantage of the presence of ants to infest some apple seedlings. The only time I have found *Pachypappella reaumuri* on the Lime (*Tilia*) in great numbers, I was struck with the enormous amount of ants running up and down the trees, and then I found they were carrying the Aphides down, apparently to the soil. I had no opportunity of examining their formicaries, as they all occurred under the walls of an adjacent house. The British *Pemphigini* recorded here are found when away from the "Galls" on Poplars, either in the soil or on plants growing close to the ground and several in ants' nests. The *Prociphilini* in this country are also much attended by ants and they carry them to their formicaries. Mordwilko has recently shown that some of the *Fordini* (*Paracletus*, *Trifidaphis*, *Forda* and *Pentaphis*), form galls on *Pistacia*.

KEY TO THE TRIBES OF *Eriosomatinae*.

1. Cornicles present, at least in alatae, often rings 3
 Cornicles absent 2
2. Forms living in true galls or in pseudo-galls on plants.
 Forms living in ants nests or subterranean feeding on the roots of plants and producing galls on *Pistacia*. Wax secreting areas present; antennae of alatae rather short and thick, with somewhat oval or rounded sensoria, several on segment iii. of alatae; iii. the longest segment. *Fordini*.
 Forms living in true galls and without prominently developed wax plates on the head and thorax of the alate females; wax secreting areas present but not usually prominently developed. Alatae leave the galls in late summer. Antennae with annular sensoria. *Melaphidini*.

Forms living in galls and in the earth on roots. Antennæ of alatae of six segments ; segments iii. to vi. each with a single large sensorium. Wax plates well developed.

Aploneurini.

Forms living in pseudo galls, rarely in true galls. Antennæ of alatae rather long and slender, with narrow or somewhat oval or rounded sensoria. Wax plates well developed and present on the head and thorax of alatae, which leave the galls in spring and early summer.

Prociophilini.

3. Forms living in galls or pseudo galls or free upon their hosts ; wax glands prominently developed ; alate antennæ with annular sensoria, which almost completely encircle the segments. Tarsi of apterae of two segments (*Eriosoma*), or of one segment (*Tetraneura*)

Eriosomatini.

Forms living in true galls ; wax glands present, but not as a rule strongly developed ; antennæ of the alatae with narrow transverse sensoria, somewhat oval or irregular, or occasionally without sensoria.

Pemphigini.

Tribe FORDINI.

The insects in this tribe are subterranean species, when in the apterous stages, but the alatae appear above ground for a short time and some are true gall formers. Most, if not all, are much attended by ants, some such as *Paracletus* are entirely Myrmecophilous when subterranean, others as *Forda* almost entirely so, whilst *Geoica* are often met with in ants' nests as well as on the roots of grasses, corn and other plants. There are no cornicles in this tribe, but they are represented by wax glands. The apterae produce honey dew which is collected by the ants. Some alate females produce slight woolly secretions, others none. Alatae are very scarce. Eyes in the subterranean apterae are marked, having only three facets. When living in the soil most are pallid in colour, yellow, white, pale green or pallid pink, a few may be dark brown or dull red. Several genera in this tribe have been sunk by Baker as synonyms, some I think incorrectly.

The genus *Rectinasus* (Theo.) for instance, is quite distinct from *Forda* and has been even placed in a separate tribe by Mordwilko ; nor are *Trifidaphis* or *Tycheoides* like *Geoica*.

The genera of *Fordini* in Great Britain are *Geoica*, *Forda*, *Tycheoides*, *Pentaphis*,* *Paracletus* and for the time being I leave *Trifidaphis* here.

These tabulate as follows :

- A. Antennal segment ii. of alatae and apterae equal to or nearly to i.
1. Antennae of alatae and apterae of 5 segments.
Antennae of apterae rather long and thin ; alate sensoria more or less rounded. *Forda*.
Antennae of apterae rather short and thick ; alate sensoria elongate oval. *Pentaphis*.
 2. Antennae of alatae of 6 segments.
Antennae of apterae of 5 or 6 segments, short and thick, stumpy apex. Sensoria of alatae few, oval, elongate. *Geoica*.
Antennae of apterae of 5 segments, short and rather thin ;
ii. about same length as i. *Tycheoides*.
Antennae of apterae of 6 segments, larger than above ; alatae with round sensoria on iii., iv., v. and vi. *Paracletus*.
- B. Antennal segment ii. of alatae and apterae much longer than i. ;
alate antennae of 5-6 segments ; sensoria on iii. round to elongate oval. *Trifidaphis*.

Genus, *FORDA* Heyden.

Rhizoterus Hartig.

Smynthuroides Westwood.

Heyden, Mus. Senk., II., 291 (1837) ; Hartig, Zeit. Ent., III., 363 (1841) ; Westwood, Gard. Chron., 420 (1849) ; Kaltenbach, Mono. Pflanz., 209 (1843) ; Walker, List Homop. (B.M.), IV., 1060 (1852) ; Koch, Die Pflanz., 309 (1857) ; Buckton, Mono. Brit. Aphid., IV., 83 (1882) ; Baker, Bull. 826, U.S. Dept. Agri., 70 (1920) ; Cutwright, Bull. 387, Ohio Agri. Exp. Station, 210 (1925).

Antennae of apterae and alatae of 5 segments. In the apterae segment iii. the longest, rather narrow ; in alatae segment iii. also long ; the sensoria numerous, irregular in shape, but more or less rounded. Cornicles wanting. Front wings with simple media ;

* Mordwilko and Baker place this genus under *Forda*.

hind ones with cubitus and media, arising slightly apart. Eyes very small, of 3 facets. Abdomen rounded above, becoming more convex with age. Tarsi of 2 segments, basal one small; hind tarsus short.

The alatae of *Forda* have been described in Europe by Crawley, and in America by Gillette and Cutwright.

The species of *Forda* occur in small scattered companies at the roots of many grasses and a few other plants, where they feed upon the fine rootlets. They are very general in ants' nests, *Forda* being by far the commonest and most widely distributed Myrmecophilous genus. The genus occurs in Europe, Africa and North America.

The type of the genus is Heyden's *formicaria*. Horvath's genus *Pentaphis* with Koch's *marginata* was sunk by Baker, but I have reinstated it and also my genus *Rectinasus*, which Baker also placed as a synonym of *Forda*. Hartig's genus *Rhizoterus* was founded on his species *vacca*, which is only *formicaria*. I have followed Baker in sinking Westwood's *Smynthuroides* founded on his *betæ*.

The following are found in this country :

Forda formicaria Heyden.

Forda viridana Buckton.

Forda hexagona Theobald.

Forda furcata Theobald.

In Buckton's collection I find a specimen labelled *Forda pilosa* on *Carex* roots from Alnwick. It does not seem to have been described and is evidently only *formicaria*.

KEY TO BRITISH *Forda*.

Apterous viviparous females.

1. Integument of head with small spines. Cephalic hairs rather long, straight. Antennæ moderately long and thick. *formicaria*.
Cephalic hairs short, curved outwards from centre; antennæ thinner and shorter than in former. *viridana*.
Cephalic hairs slightly furcate, also body hairs. *furcata*.
2. Integument of head and part of body with hexagonal sculpturing. *hexagona*.

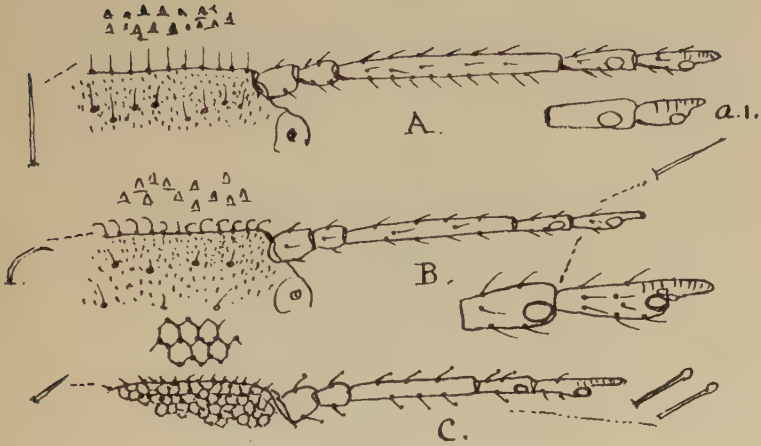


Fig. 89.

A. Head and antenna of *Forda formicaria* Heyden ; a.i. Further enlarged apex ; B. of *Forda viridana* Buckton ; C. of *Forda hexagona* Theobald.

Alate viviparous females.

Antennal segment iii. with 50 sensoria ; iv. with 4-5 + 1.

formicaria.

Antennæ shorter than former ; iii. with 45-48 ; iv. 0-3 + 1.

viridana.

FORDA FORMICARIA Heyden.

Rhizoterus vacca Hartig.

Aphis radicum Spence.

Smynthuroides betæ Westwood.

Heyden, Mus. Senck., II., 292 (1837) ; Hartig, Germ. Ent. Zeit., III., 363 (1841) ; Kaltenbach, Mono. Pflanz., 209 (1843) ; Amyot, Ann. Soc. Ent. Fr., Se. 2, V., 486, 541 (1843) ; Walker, List. Homop. (B.M.), IV., 1060 (1852) ; Koch, Die Pflanz., 309, figs. 378, 379 (1857) ; Smith, Trans. Ent. Soc. Lond., 2, III., 98 (1854) ; Cameron, Proc. Nat. Hist. Soc. Glasgow, II., 246 (1874) ; Buckton, Mono. Brit. Aph., IV., 83, pl. CXXIII. (1882) ; Wasmann, Hist. Ver. d. Myr. u. Term. Art., 189 (1894) ; Victoria Hist. Surrey, 175 (1902) ; Donisthorpe, Ent. Rec., 39 (1902) ; Schouteden, Mém. Soc. Ent. Belg., XII., 193 (1906) ; Victoria

Hist. Cornwall, 245 (1906) ; Victoria Hist. Devon, 244 (1906) ; Donisthorpe, Ent. Rec., 6 (1907) ; Halbert, Irish Nat., 53 (1907) ; Theobald, Hastings and E. Sussex Nat., II., 1, 10 (1912) ; Theobald, Ent. Rec., 49 (1913) ; Donisthorpe, Ent. Rec., 267



Fig. 90.—*Forda formicaria* Heyden.
Apterous ♀.

(1913) ; Crawley, Ent. Rec., XXVIII., 12 (1916) ; Cutright, Ohio. Agri. Exp. Sta. Bull., 387, 210 (1925) ; Mordwilko, Bull. Ent. Res., XIII., pt. 1, 35 (1922).

Apterous viviparous female. White, creamy, dull yellow or various shades of green, or with a green or grey dorsal stripe, a few with a paler border. Longish oval, with rounded, blunt, projecting cauda retracted into the posterior segments. Legs in pale forms pallid, with dusky tarsi or brown all over. Head flat and broad, with rather long, straight hairs and the integument finely spotted, due to minute spines. Eyes small, black and fairly prominent. Antennæ of 5 segments, of variable length in different stages, usually a little less than one-third of the body, but in some forms quite half the length ; segments i. and ii. small ; i. a little shorter and broader than ii. ; iii. longest, always longer than iv.+v., now and then nearly twice their length ; iv. usually a little longer than v., which is slightly darkened and has a short blunt nail ; at the apex of iv. there is a clear round primary

sensorium and a large rather elongate one at the base of the "nail," with 2 secondary ones above it; all the segments with fine short hairs. Rostrum rather long, reaching beyond the third coxæ, variable in length, pallid or brown, apex darkened. Legs

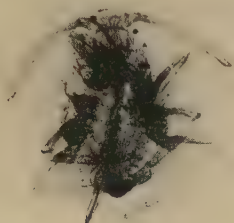


Fig. 91.—*Forda formicaria* Heyden.
Larva.

moderately long; tarsi of 2 segments; basal one very small; unguis paired; tibiæ and tarsi hairy, to some extent the femora. Cauda rounded, bristly. Body with fine scattered hairs.

Length 2.2 to 2.8 mm.

Nymph. Antennæ, legs and rostrum as in apterous female; eyes relatively larger, tinged with red in balsam preparations. Wing-buds pale.

Alate viviparous female. Abdomen dull green; cauda and rims of apical segments black, the other segments with broad transverse dark bars, diminishing in length and breadth and finally disappearing before the thorax is reached; head, thorax, antennæ and legs black; eyes dull red. Rostrum half length of body, apical segment long and narrow. Antennæ of 5 segments; i. as broad as or broader than long; ii. somewhat narrower and longer, swelling slightly at apex; iii. by far the longest and almost completely covered on its underside with large oval and round sensoria, more than 50 on the right and rather less than 50 on the left antenna in one specimen; iv. a little more than one-third of iii., with 1 extremely large irregular sensorium at its apex and a row of 4 to 5 of normal size behind; v. shorter than iv., "nail" short

under which is the usual large sensorium and a group of 3 small ones. The whole antenna is less than half length of body. Head short and broad, vertex with deeply impressed line and convex on each side of the line. Eyes large, with a projecting lower portion; an ocellus above each compound eye and a third in centre of vertex.



Fig. 92.

A. Antenna of alate ♀ *Forda formicaria*; B. of *Forda viridana*.

Body flatter than in apterous form and legs longer. Cornicles mere pores, hardly visible. Cauda short and rounded. Wings faintly imbricated all over, except near insertion of the cubitus and the stigma is more coarsely and densely so and smoky, as are the nervures. The first and second oblique nervures rise from the same point in the cubitus and the cubital nervure is single and rises some distance from the cubitus. The lower wing has two oblique nervures. Antennæ, legs and vertex have short fine hairs and the cauda longer ones.

Length 2.6 mm. (Crawley.)

Larval stages. In the larval stages the antennæ, legs and rostrum are relatively much longer, the rostrum projecting well beyond apex of body.

FOOD PLANTS. *Holcus mollis* roots in ants' nests (Hardy, in Buckton); *Sonchus oleraceus* roots (Walker); *Gramineæ* (Schouteden); *Poa pratensis* (Passerini); *Dactylis glomerata*; *Festuca spp.*; *Bromus spp.*; Artichoke roots (Theobald); *Triticum repens* (Buckton).

ANTS' NESTS, FOUND IN. *Lasius flavus*, *L. alienus*, *L. niger* (Crawley, Britten, Donisthorpe); *Tetramorum caespitum*; *Myrmica scabrinodis*; *M. ruginodis*, *M. laevinodis* (Donisthorpe); *Myrmica sp.*, at roots of *Holcus mollis* (Hardy in Buckton, p. 84); *Formica flava* (Koch, 309; Buckton, 83). Frequent in ants' nests (Schouteden). In nests of the smaller kinds of ants (Heyden, 292). In nests of most small species of ants, especially *Lasius flavus* (Wassmann, 187). On grass roots in

nests of *Lasius niger* var *alieno-niger* (Crawley). Common in small Red ants' nests (Theobald).

LOCALITIES. Box Hill, Surrey, 13 iv. 11 and 14 v. 11; Winton-on-Tyne, 23 v. 09; Whitsand Bay, Cornwall, iv. 09; Dartmouth, iv. 08; Sandown, Isle of Wight, 24 iv. 09; Hartlepool, Durham, 10 x. 10; Bradgate Park, Leicestershire, 3 v. 09; Porlock, Somerset, 27 iv. 11; Lundy Island, 10 vi. 13; St. Issey, Cornwall, 25 v. 11; Islip, Oxford, 12 v. 10; Bletington, 16 v. 13; Tenby, 29 iv. 13 (Donisthorpe); Lawrence Weston, Bristol; Penarth, Glamorgan; Forest of Dean; Plymouth (B.M. Coll.); Bulverhithe, Hastings, vi. 07; Wye, Kent, 7 v. 08; Littlestone, vii. 13; Worthing, 4 viii. 21; Blackheath Vale, 4 xii. 09 (Theobald); Greak Salkeld, 13 vi. 12 and 24 iii. 13; Wan Fell, Cumberland, 25 ix. 12 (Britten); Truro, Cornwall (F.V.T.); Weybridge, Surrey, 14 vi. 14 (Crawley); Isle of Eigg, Hebrides, N.B., 17 ix. 11; Loch Aber, near Dumfries, 31 iv. 08; Arthurs Seat, Edinburgh, 13 v. 09; Isle of Tirce, 1 v. 12; Forth Bridge, 13 v. 09; Netley Bridge, Inverness, 18 v. 12 (Donisthorpe); West Allendale, 1,000 ft., vi. 12 (Hull); Glasgow, 14 ii. (Cameron); Isle of May, Scotland, ix. 10 (Evans); Harlech, N. Wales, 22 vi. 06 (Donisthorpe); Near Sallins, Kildare, 24 iv. 24; (Stelfox); Borrisokane, N. Tipperary, 24 viii. 24 (Phillips); Balrath, Co. Meath, ix. 10 (Donisthorpe); Co. Dublin (Halbert). Frankfurt (Heyden); Prussia (Walker); Germany (Kaltenbach, Koch); Italy (Passerini, Del Guercio).

Observations. The life-cycle has not been traced. What happens to the alatae we do not know, probably they deposit their young on or near the roots of other grasses, etc. At some distant period they probably had some alternate host, such as we see with some other root forms (*Pemphigus*, *Paracletus Anoecia*, *Aploneura*). The apterae may be found practically all the year at the roots of grasses, etc., and in ants' nests, where the ants carefully tend them, but they are especially noticeable from February to May and again from September to February. I have found nymphæ as early as May 15th, and have received them from Cumberland in June; I also found two in July. Crawley bred the alatae on May 27th and found nymphæ on May 16th. He noticed that almost immediately after emergence that the aphides began to display great activity, running with rapidity up and down a grass stem,

evidently trying to escape. It appears that the alatae escape from the soil directly they hatch, and this may account for their not being noticed.

Gillette, Ent. News, XXIX., 281 (1918), describes an alate *Forda* as *Forda formicaria* Heyden, having identified the American *Forda* from specimens I sent him of the apteræ. The alate female however, differs from *formicaria* in regards to the antennæ which are shorter and differ in sensoriation. He sinks Hart's *Forda occidentalis* (18th Rept., Ill. St. Ento., 95, 1894) as a synonym also Hartig's *Rhizoterus vacca* and Koch's *Tychea graminis*. I think Hart's name *occidentalis* must remain for the American species, which is certainly distinct. *Vacca* is *formicaria* and Koch's *Tychea graminis* is distinct.

FORDA VIRIDANA Buckton.

Buckton, Mono. Brit. Aphid., IV., 85, pl. CXXVII., figs. 1 and 2 (1882); Wasmann, Myrm. u. Term. Art., 187 (1894); Victoria Hist. Devon, 244 (1906); Theobald, Ent. Rec., XXV., 49 (1913); Crawley, Ent. Rec., XXVIII., 12 (1916).

Apterous viviparous female. Emerald green to various shades of brown, a few pale and almost creamy-white. Oval. Pilose or velvety in appearance. Legs and antennæ brownish, especially

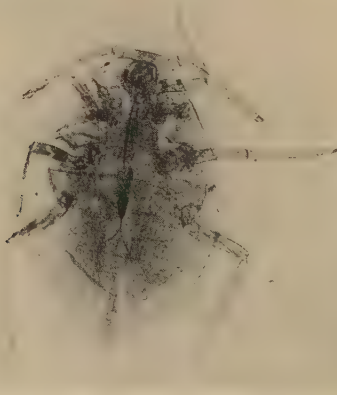


Fig. 93.—*Forda viridana* Buckton.
Apterous ♀.

the tips of the antennæ. Thorax and abdomen domed, especially so in the adult stage. Eyes very small. Rostrum varying from half to three-fourths the length of the body; longer in the early instars. Cauda blunt. Frontal hairs short, curved outwards, also those on the vertex. Antennæ with the first segment broader and shorter than ii; ii. broader and very nearly as long as iv.; iii. much the longest, longer than iv. + v.; iv. a little shorter than v., which is darkened; sensoria on iv. and v. normal; hairs short and scanty. Antennæ about one-third length of the body and relatively thinner than in *Forda formicaria*. Rostrum normally reaches past second coxæ, apex dark. Cauda dusky-brown. Whole body covered with fine spines, giving a velvety appearance described by Buckton. Also a few scattered hairs on the body.

Length 2 to 2.5 mm.

Alate viviparous female. (Described by Crawley.) "Dull reddish-brown; abdomen with central transverse bars of dusky-brown; longest and widest near cauda, diminishing in size towards thorax. Meso- and meta-thorax dark brown; prothorax with a dark patch on each side and a central rectangular space of red surrounded by a dark line; head nearly black. Eyes dark red. First 2 segments of antennæ and basal half of third, dark, also the tip of the fifth; the remainder whitish. A portion of both wings, on the lower part, a little distance from the base, is tinged with a reddish shade. The rostrum reaches considerably beyond the centre of the body; the last joint is long and thin, hardly wider at base than near apex. Antennæ 5-jointed; the first as broad as long, the second narrower and slightly longer, swollen at apex, the third longest, rather more than one and a half times as long as the fourth + fifth, its under surface covered with large oval and round sensoria, 45-48 in number; they are not so large or so prominent as in *formicaria*, fourth segment slightly longer than fifth, with one large irregular sensorium at the apex and three (right antennæ) or four (left) small circular sensoria in a row from the apical one to the base; fifth segment with a short, blunt "nail," under which is a large sensorium and a group of three small ones. The whole antenna is less than half the length of the body. Vertex with a central impression and slightly convex on each side of this. Eyes large, with a lower projecting portion. There is an ocellus above each compound eye and a third in the

centre of vertex. Legs long, considerably longer than in the apterous form. Cauda short and rounded. The abdomen is flatter than in the apterous form. Cornicles mere pores. Upper wing with a single cubital vein arising some distance from the cubitus. The first and second oblique veins rise from the same point in the cubitus. Both wings are delicately imbricated over their entire surface, except along the cubitus in the upper wing; the stigma is more coarsely imbricated, and also is coloured a smoky brown like the nervures. Pilosity rare; a few short hairs on antennæ and a tuft of longer ones on apex of nail of fifth segment and fine hairs on cauda. Length 1.9 mm."

FOOD PLANTS. *Aira flexuosa*; *Triticum repens*; *Carex* sp. (Buckton); *Dactylis glomerata*; *Bromus mollis*; all on roots (Theobald).

ANTS' NESTS FOUND IN. *Formica fuliginosa* (Hardy, Buckton); *Lasius flavus* and *L. alienus* (Donisthorpe); *Lasius flavus* (Wasmann); *Myrmica scabrinodis* (Hull).

LOCALITIES. Wooley, Northumberland, v. and vi.; Alnwick (Buckton); Whitsand Bay, Cornwall, iv. 09; Box Hill, Surrey, 13 vi. 11; Lundy Island, 9 vi. 13 (Donisthorpe); West Allendale, 1,000 feet (Hull); Wye, 17 v. 26 (F.V.T.); Isle of Eigg, Hebrides, 17 ix. 11; Bohemia (Wasmann).

Observations. I cannot find Buckton's type of this species in the British Museum, but there is a *Forda*, named "*pilosa* from *Carex* roots, Alnwick in ants' nest" that may refer to *viridana*, if so that insect is only *formicaria*. Mr. Laing writes me as follows:—"On the 22 xi. 1922 I wrote, when filing away Buckton's slide of *Fordu pilosa*, 'Though this is labelled *Forda pilosa* it is evidently the type of *Forda viridana* Buckton, Vol. IV., p. 86.' That slide represents, I think, *formicaria*." The species described here may thus want a new name. Buckton says *viridana* differs from *formicaria* in being smaller, more pilose and deficient in the green dorsal stripe; but I frequently find that *formicaria* has no dorsal stripe. The size of the latter varies a great deal and neither stripe nor size can be specific characters. What I take to be Buckton's *viridana* can at once be separated by the hairs in front of the head being short and curved outwards from the middle and the antennæ are shorter and decidedly

narrower than in apterous *formicaria* and the antennæ of the alate female are quite distinct.

Buckton's original description is as follows: "Viviparous female, 2.03×1.26 mm. Oval, dull, pilose, velvety. Chocolate brown or mouse colour to emerald green; legs and antennæ ginger brown. Vertex setose. Eyes very small. Thorax and abdomen much corrugated and domed. Rostrum three-quarters length of body. Tail blunt and carried slightly erect. Claws double. Taken in Ants' nests covered by tufts of various grasses."

FORDA HEXAGONA Theobald.

Ent. Record, XXVII., 353 (1915).

Apterous viviparous female. Globular in form, somewhat flattened behind. Head broad and flat, slightly rounded at the sides; integument finely spinose and marked with hexagonal sculpturing, which passes also on to the pronotum; a few short curved hairs in front. Antennæ of 5 segments, rather short and

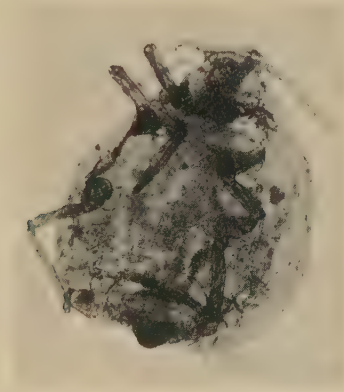


Fig. 94.—*Forda hexagona* Theobald.
Apterous ♀.

narrow, varying from one-third to one-quarter length of the body; segment i. broader but shorter than ii.; iii. the longest, about as long as iv. + v.; iv. slightly swollen towards apex, where there is a single primary sensorium; v. a little longer than iv., with a marked blunt "nail," one large and four small sensoria at the

base of nail ; iii. to v. with a few hairs, some faintly capitate and a few slightly so on i. and ii. Eyes small, but prominent, black. Rostrum reaches to or close to base of third coxæ. Legs and antennæ deeper colour than body, brown ; legs with scanty hairs. Cauda very dark, with numerous short, pale hairs.

Length 1.5 to 2 mm.

LOCALITIES. Whitsand Bay, Cornwall, iv. 09 ; Tenby, iv. 13 (Donisthorpe). Chapelleton, Guernsey, found in an ants' nest (Laing).

Observations. This species, which seems to me to come nearest *Forda viridana*, can be told by the rather short, thin antennæ and by the hexagonal sculpturing on the head. One specimen was found in a nest of *Formica fusca*, the other two with *Lasius flavus*.

FORDA FURCATA Theobald.

Ent. Rec., XXVII., 3, 53 (1915).

Apterous viviparous female. Pearly to creamy-white ; domed ; segments marked ; legs pallid ; tarsi dusky. Antennæ pallid but darkened at the tips. Rostrum pale, base brown, broad, reaching past second coxæ. Vertex broad, slightly rounded. Antennæ moderately long, of 5 segments ; i. and ii. small, about equal ; iii. longest, as long as iv. + v., showing a slight constriction near apex ; iv. slightly longer than ii. ; v. nearly twice as long as iv. ; all the segments with rather long simple hairs ; iv. with

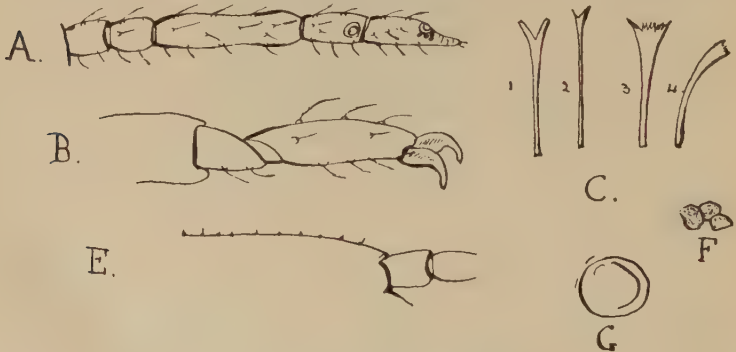


Fig. 95.—*Forda furcata* Theobald.

A. Antenna of apterous ♀ ; B. Tarsus ; C. 1 and 2. Cephalic hairs, 3 and 4. Body hairs ; E. Head ; F. Eye ; G. Cornicle.

normal apical primary sensorium ; v. with large primary and several small sensoria just below the " nail," which is short. Eyes reddish, very small, of 3 facets. Legs rather short, with dark tarsi ; many rather stiff dark hairs on all the segments. Cephalic hairs both simple and *furcate* ; on the body the hairs are more or less expanded apically, others slightly capitate. Cauda pale, rounded, with four long pale hairs and some median shorter ones ; notched at the sides and from each notch arises a long hair.

Length 1.5 to 2 mm.

LOCALITY. Sandown, Isle of Wight, 24 viii. 08 (Donisthorpe).

Observations. Described from two females taken in the nest of *Myrmica laevinodis*. It can at once be recognised by the form of the hairs. It approaches Buckton's *viridana*. The siphon openings are quite level with the body.



Fig. 96.—*Forda furcata* Theobald.
Apterous ♀.

Genus TYCHEOIDES Schouteden.

Tychea Passerini (non Koch).

Schouteden, Mém. Soc. Ent. Belg., XII., 194 (1906) ; Passerini, Gli. Afidi., 30 (1860).

Apteræ with 5 antennal segments, rather thin, the apical one not stumpy, as in *Geoica*. Wax glands present. All subterranean. Segments i. and ii. about equal ; ii. never long as in *Trifidaphis*. Alate females unknown.

The genus *Tychea* of Passerini was renamed *Tycheoides* by Schouteden. Passerini described five species of *Tychea* from Italy one (*trivialis*) was removed by Horvath to *Pentaphis*. Koch's *Tychea* is a different genus—*Geoica*. Two species occur in Great Britain :

Tycheoides eragrostidis Passerini.

Tycheoides setariæ Passerini.

Mordwilko places *Tychea* in the Tribe *Pemphigea* (Bull. Ent. Res., XIII., 2, p. 39, 1922).

TYCHEOIDES ERAGROSTIDIS Passerini.

Tychea eragrostidis Passerini.

Tycheoides eragrostidis, Schouteden.

Tychea brevicornis Forbes (Hart).

Passerini, Gli Afidi., 39 (1860) ; Forbes, Eighteenth Rept. Nox. and Ben. Ins. Ill., 97, fig. (1894) ; Schouteden, Mém. Soc. Ent. Belg., XII., 194 (1906) ; Rymer Roberts, Lanc. and Ches. Nat., IX., 278 (1915) ; Theobald, Entomologist, XLIX., 52 (1916).

Apterous viviparous female. White, creamy white, glabrous, but with a small amount of white meal ; mature forms ovoid. Head rather darkened. Anal plate small, dusky. Abdomen domed and well sutured. Antennæ short, dusky to brown ; of 5 segments, in a few cases of 4 segments, in some i., ii., iii. and iv. are nearly equal, in others i. is very small and now and then iii. is

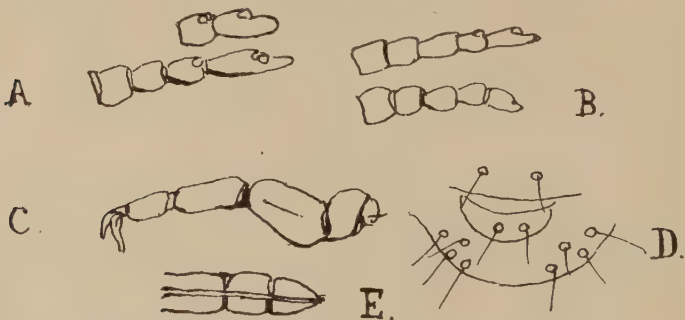


Fig. 97.—*Tycheoides eragrostidis* Passerini.

A. Antenna of larva ; B. of apterous ♀ ; C. Leg ; D. Anal plate and cauda ; E. Apex of rostrum.

a little longer than ii.; v. the longest, with a short, blunt nail; sensoria on iv. and v. normal. Rostrum short and thick, blunt, reaching nearly to or to the second coxæ, apex darkened, last two

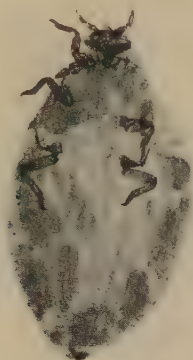


Fig. 98.—*Tycheoides eragrostidis* Passerini.
Stem Mother.

segments nearly equal. Legs brown, short and stumpy, at times some specimens show them longer than usual. Eyes black, minute.

Length 1 to 1.3 mm.

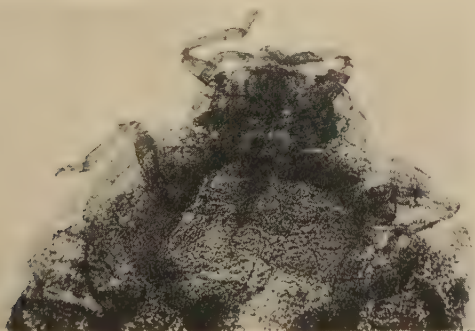


Fig. 99.—*Tycheoides eragrostidis* Passerini.
Apterous ♀. Showing short antennæ and rostrum.

The Mother-Queen is more shuttle-shaped and the legs seem to be proportionately shorter.

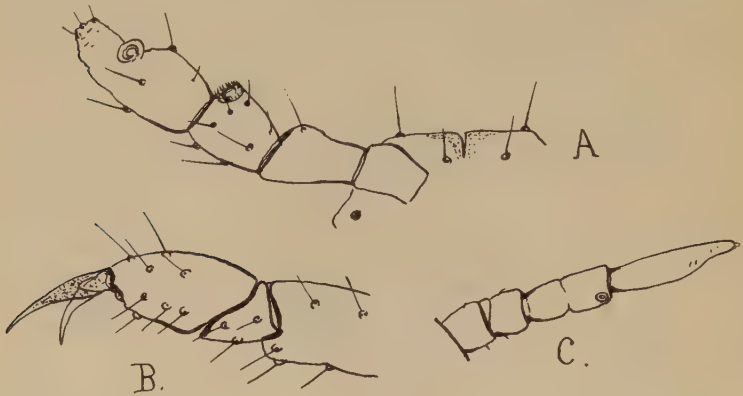


Fig. 100.—*Tycheoides evagrostidis* Passerini.
A. Head and antenna of larva ; B. Ungues and hind tarsus ; C. Antenna of apterous ♀.

FOOD PLANTS. Roots of grasses and wheat, and *Pinus sylvestris*.

LOCALITIES. Rothamsted, 20 xi. 15 ; Paddock Wood, xii. 91 ; Wye, 7 iii. 12 (on *Pinus*), 11 iv. 20 and 20 iii. 26 (F.V.T.) Hastings, xi. 99 ; Little Hadham, xi. 27 ; Abingdon, Oxon, viii.



Fig. 101.—*Tycheoides evagrostidis* Passerini.
Larva.

27 (F.V.T.) ; Great Salkeld, Penrith (Britten) ; Malldraeth Marsh, Anglesey, N. Wales, 11 iv. 22 (Walton).

Observations. An abundant species where I have found it. It often swarms on grass roots, growing in fields and on paths, but does not seem to affect the growth in any way. The species may easily be told by the short, blunt rostrum and stumpy legs. According to Laing "Buckton's *eragrostidis* (Pass.) is the same as *Pentaphis auriculæ*."

Auriculæ I place in *Pemphigus*. Buckton's *eragrostidis* is thus not Passerini's insect, which I describe in this volume.

In spite of keeping large numbers of this species, both in the laboratory and outdoor insectary, I have never been able to obtain an alate female.

TYCHEOIDES SETARIÆ Passerini.

Tychea setariæ Passerini.

Geoica setariæ Hart.

Passerini, Gli. Afidi., 40 (1860) ; Buckton, Mono. Brit. Aphid., IV., 88, pl. CXXVIII., figs. 1-3 (1882) (part) ; Hart, 18th Rept. St.

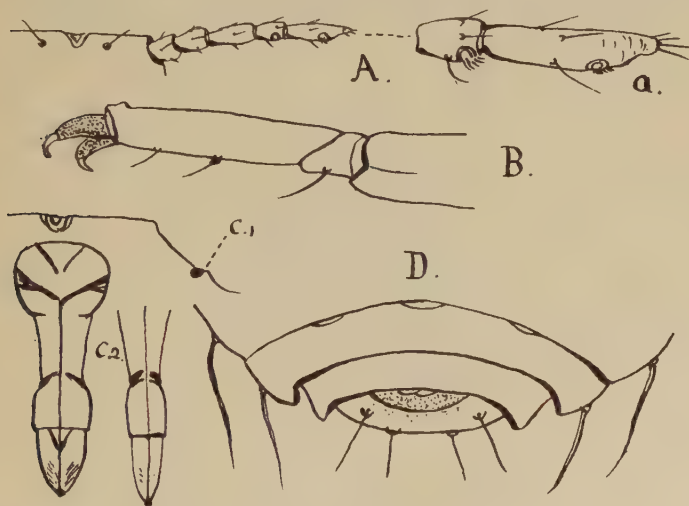


Fig. 102.—*Tycheoides setariæ* Passerini.

A. Antenna of apterous ♀; a. Apex further enlarged; B. Hind tarsus; C.1. Eye; C.2. Two types of rostrum; D. Apex of body.

Ent. Illinois, 101 (1894); Donisthorpe, Ent. Rec., 6 (1907); Theobald, Ent. Rec., 49 (1913).

Apterous viviparous female. Globular to slightly oval, rather flat; white, somewhat dull, sometimes with a green tinge. Antennæ, legs and rostrum brown, the latter darkened at apex. Antennæ short, about one-fifth length of the body (Buckton says one-quarter); of 5 segments; i. slightly shorter and broader than ii. to nearly equal; iii. slightly longer than ii. and constricted at base; iv. smallest; v. about as long as iii. to slightly longer; a pale band at apices of iii. and iv.; a few short scattered hairs; a dark sensorium at apex of iv. and one with fringed border at base of the short, blunt nail on v.; several short hairs on "nail." Eyes small, black. Rostrum short, thick, brown, apex dark, reaching to between second and third coxæ, up to the third. Legs brown, short and thick, scarcely projecting beyond the sides of the body; tarsi of 2 segments. Segmentation of body marked. Some short, fine lateral hairs. Cauda retracted, dusky, with some long hairs.

Length 1.5 to 2 mm.

The young forms really the viviparous progeny of the fundatrix, have only 4 segments to the antennæ and the legs also appear



Fig. 103.—*Tycheoides setariæ* Passerini.
Apterous ♀.

longer. The third antennal segment is long. Both body and cephalic hairs markedly curved at their apices.

FOOD PLANTS. *Setaria glauca* and *Zea* (Passerini).

ANTS' NESTS FOUND IN. *Lasius flavus*; *L. niger*; *L. umbratus*; *Formica fusca* var. *fusco-rufibarbis*; *Myrmica ruginodis*; *Tetramorium caespitum* (Donisthorpe and Crawley).

LOCALITIES. Beckenham (Buckton); Ashtead, Surrey, 13 vi. 06; Darenth Wood, Kent, 5 vi. 09; Loch Aber, near Dumfries, 31 iv. 08; Whitsand Bay, Cornwall, 11 iv. 06 (Donisthorpe); Porlock, Somerset, iv. 15; Weybridge, Surrey, 14 iv. 14 (Crawley); New Romney, Kent, 7 v. 20; Ely, 14 vi. 07; Fowey, Cornwall, 7 viii. 10; Wye, 7 vi. 24 (F.V.T.).

Observations. I have only seen this insect in the apterous viviparous female stage, the so-called "Foundress" of the Colony of Buckton.* They were all obtained in April, May and June. Buckton says the fundatrix attended by a few young may be taken as early as February; he describes the antennæ as being of 4 segments, but figures them with 5 segments. The insect he figures (Pl. CXXVIII., fig. 3) as a later and more developed brood, seems to me to be an immature insect. The mature specimen figured by Buckton (pl. CXXVIII., fig. 4, 4a and 4b) is certainly not this species. It is apparently a *Forda* from the long third antennal segment. Mr. Laing says it seems to be *Forda formicaria* from an examination of Buckton's slide, the two specimens being those figured at 4 and 4a. Two capitate hairs on the tarsi should at once separate *setariæ*.

Genus PENTAPHIS Horvath.

Wien. Ent. Zeit., XV., 2 (1896).

The original description is as follows: "Aphis possédant des antennes à 5 articles inégaux, le troisième étant beaucoup plus long que les autres. Ailes au repos, disposées en forme de toit; cubitus des ailes antérieures non fourchu; ailes postérieures ayant deux nervures transversales prenant naissance à une assez grande distance l'une de l'autre et loin de la nervure du bord intérieur."

The type of the genus was Koch's *Forda marginata*, whilst later Del Guercio placed Passerini's *Tychea trivialis* as type.

* In 1915 Crawley sent me specimens from Porlock and one from Weybridge, in the four segmented antennal stage—the virgogenia.

The apteræ certainly come near *Geoica*, but the alate female sensoria certainly exclude it from that genus, under which it was sunk by Baker.

Mordwilko treats this genus as *Forda*.

PENTAPHIS MARGINATA Koch.

Forda marginata Koch.

Koch, Die Pflanz., 311, figs. 380, 381 (1857) ; Horvath, Wien. Ent. Zeit., XV., 2 (1896) ; Vayssière, Ann Fac. Marseilles, VIII., 215-216, pl. XI.

Apterous viviparous female. Ovoid. Creamy-yellow to ochre-yellow, with whitish borders. Legs and antennæ pale yellow ; former slightly hairy ; the latter with conspicuous hairs.

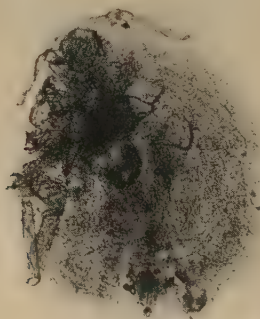


Fig. 104.—*Pentaphis marginata* Koch.

Antennal segment i. large ; ii. slightly larger and narrower ; iii. longest ; iv. small, about as long as i., but narrower ; v. longer than iv., rather more than half of iii. ; nail short and truncate ; normal primary sensorium on iv. and v., latter with 2 small ones also at base of "nail." Cephalic hairs short ; body devoid of hairs. Rostrum pale, apex dusky. Eyes black, small, but prominent.

Length 2 to 2.5 mm.

Alate viviparous female. Vide following species.

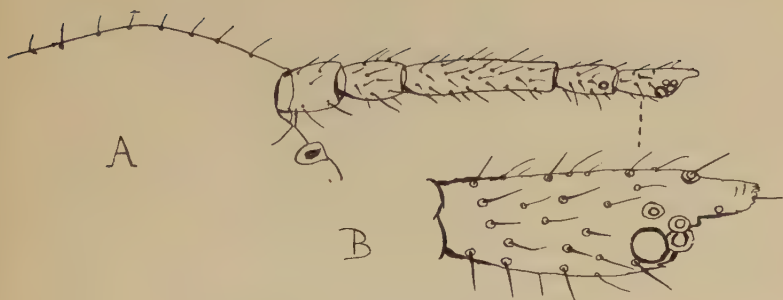


Fig. 105.—*Pentaphis marginata* Koch.

A. Head and antenna of apterous ♀; B. Apex of antenna, further enlarged.

FOOD PLANTS. Roots of various grasses and corn.

ANTS' NESTS, FOUND IN. *Formica flava* (Koch); *F. fusca*; *Lasius niger* (Donisthorpe); *Tetramorium cæspitum* (Donisthorpe);

LOCALITIES. Romney Marsh, Kent, 4 vii. 16; Minster, Thanet 4. vi. 17 (F.V.T.); St. Issey, Cornwall, 25 vi. 11; Lundy Island, 9 vii. 13; Forth Bridge, N.B., 13 v. 09 (Donisthorpe); Germany (Koch); France (Vayssière); Hungary (Horvath); Russia.

Observations. I have only seen a few apteræ of this species taken on the roots of wheat and barley. It comes near *trivialis* but can be told by the more rounded head and different antennæ. This insect appears to be very common in parts of Continental Europe, where it does a good deal of damage to the roots of corn crops. Vayssière refers to it in France and Horvath to its damage, in conjunction with *trivialis*, etc., in Hungary. It is also recorded, at least a *Pentaphis*, as doing great damage to wheat in the Government of Taurida, Russia (Rept. on Inj. Ins. and Diseases of Plants in the Gov. of Taurida for 1912, p. 36, 1913).

PENTAPHIS TRIVIALIS Passerini.

Tychea trivialis Passerini.

Pemphigus retroflexus Courchet.

Passerini, Aphid. Ital., 82 (1863); Courchet, Rev. Sci. Nat. Montp., 25 (1879); Buckton, Mono. Brit. Aphid. IV., 86, pl.

CXXVII., figs. 3 and 4 (1882) ; Horvath, Wien. Ent. Zeit., XV., 2 (1896) ; Schouteden, Mém. Soc. Ent. Belg., XII., 193 (1906) ; Del Guercio, Revista di Patol. Vegetal., III., 332 (1909) ; Theobald, Ent. Rec. 50 (1913).

Apterous viviparous female. Ochreous yellow. Ovate and somewhat flattened ; segments more or less distinct. Cauda large, rounded at apex, retracted into posterior segments, marked off by a dark line ; the two following segments edged with brown in the middle. Head flat, rather narrow, with

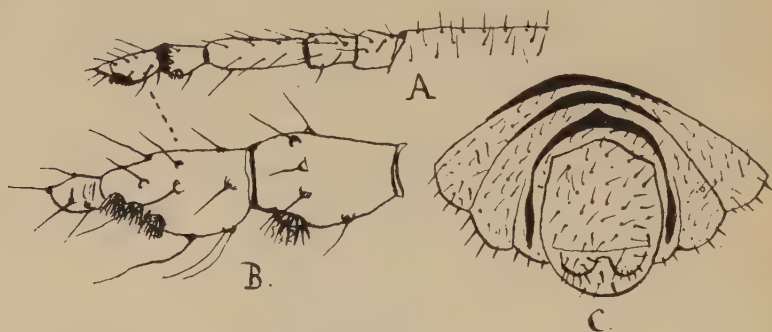


Fig. 106.—*Pentaphis trivialis* Passerini.

A. Head and antenna of apterous ♀ ; B. Enlarged antennal segments 4 and 5 ; C. Apex of body.

stiff hairs. Eyes black, very small. Antennæ very short, of 5 segments ; i. and ii. nearly equal ; iii. about as long as i. and ii. ; all provided with rather long hairs, especially v. ; sensoria marked by deeper coloured fringes of rather irregular hairs. Rostrum short and thick, reaching to the third coxæ, apex darkened. Legs dusky to brown, rather short and thick ; coxæ wide ; femora with a few hairs one side ; tibiæ with hairs all over. Abdomen and anal plate with scattered stiff hairs all over the surface.

Length 1.7 mm.

Alate viviparous female. I have not seen an alate female of this or the preceding species, so append Vayssière's description of both the alatæ and apteræ.



Fig. 107.—*Pentaphis trivialis* Passerini.
Apterous ♀.

P. marginata Koch.

Forme aptere.

Antennæ quelques épaisses.
Troupe courte, atteignant à peine l'arrière-hanche. Les deux derniers anneaux postérieurs du corps légèrement marqués par une rare transversale brunâtre plus ou moins pale.

Forme ailée.

Antennæ quelques peu épaisses ; les papilles olfactives du troisième article antennaire plus fortes, plus ou moins elliptiques et inégalement longues.

Les deux nervures transversales des ailes antérieures prenant naissance assez loin l'une de l'autre ; le pterostigma assez long, le radius partant de son milieu.

P. trivialis Passerini.

Forme aptere.

Antennes déliées. Troupe s'étendent après l'arrière-hanche. Les derniers anneaux postérieurs du corps d'une seule contens sans rare transversale brunnâtre.

Forme ailée.

Antennes assez déliées ; les papilles olfactives du troisième article de ces organes, petites, arrondies et même longueur.

Les deux nervures transversales des ailes antérieures prenant naissance non loin l'une de l'autre ; le pterostigma assez court, le radius partant de la moitié de son extrémité.

FOOD PLANTS. Roots of *Triticum vulgare*; *Poa trivialis*; *Festuca duriuscula*; *F. elatior*; *Cynodon dactylon* (Passerini); *Digitaria filiformis* (Schouteden); *Avena sativa*; *Triticum vulgare*; *Dactylis glomerata* (Theobald); *Pistacia lentiscus*; *P. terebinthus* and *P. mutica*.

ANTS' NESTS, FOUND IN. *Formica sanguinea* (Wasmann); *Lasius flavus* and *L. niger* (Donisthorpe); *Myrmica laevinodis*; *Tetramorium caespitum* (Donisthorpe); ants' nests under tufts of *Poa* (Buckton).

LOCALITIES. Beckenham in November by Lubbock (Buckton); Eastbourne, xii. 12 (Main); Lundy Island, 9 vi. 13, with *T. caespitosum*; Dartmouth, iv. 08; Bradgate Park, Leicestershire, 3 v. 09; Sandown, Isle of Wight, 24 viii. 08; Bletchington, 16 v. 13 (Donisthorpe); Wye, 1 vi. 04; 7 viii. 14 and vii. 24 (F.V.T.); Hungary (Horvath); Holland (Wasmann); Wijchmael, Belgium (Schouteden); Calais (F.V.T.); Shores of Black Sea (Mordwilko).

Observations. This seems to me to be Passerini's species. It can at once be demarked by the curious fringed sensoria on antennal segments iv. and vi. by which it is separated from Koch's *marginata*. Passerini (Aphid. Ital., 82) considers that Leon Dufours *Coccus Zeae-maidis* may be this species and notes that the presumed single claw may be due to a mistaken diagnosis. It seems to damage the roots of plants in Hungary and Russia, but is rare in Great Britain. It has mainly been found in ants' nests and attended by ants, but also feeding on the roots of grasses alone. Mordwilko has recently shown that Courchet's *Pistacia* species—*retroflexus* is this insect, it occurring as sexuparæ in May and June on *Pistacia mutica*—the galls on *Pistacia terebinthus* (Compt. Rend. d. Séances di Acad. d. Sci., 186, 1749 (1928). No *Pistacia* occurs in Great Britain now, but fossil forms occur in the Tertiary beds.

Genus GEOICA Hart.

**Endeis* Buckton (non Koch).

Trinacriella Del Guercio.

Serrataphis V. d. Goot.

Hart, 18th Rept. State Ento. Illinois, 101 (1904); Buckton, Mono. Brit. Aphid., IV., 90 (1882); Del Guercio, Redia, IX., 169

* Mordwilko separates this genus and places it in the *Pemphiginea*.

1913) ; Van der Goot z Kennt. d. Blattläuse Javas, 263 (1913) ; Baker, Bull. 826, U.S. Dep. Agri., 79 (1920).

More or less oval, somewhat domed and segmented. Antennæ of apteræ of 5 segments, rarely 6 ; short, about one-third of body ; i. and ii. and last two nearly equal ; iii. short, but always longest ; " nail " very short and blunt. Eyes of apteræ very small, of 3 facets. Cauda rounded, hairy, sometimes rectangular. Legs short. Alate female antennæ of 6 segments and with rather large oval sensoria, with marked rims. Front wings with media and cubitus, often faint. Sexuales small, apterous and arostrate. Antennæ noticeably short and stumpy.

Hart says (p. 101) : " It is well to divide the genus *Tychea*, retaining the old name for the typical species, such as *phaseoli*, and *brevicornis*, and placing *setariæ* and its allies together with the present species *squamosa* at the foot of the *Pemphiginæ*, as a new genus, for which the name *Geoica* is now proposed. Here also belongs the species described by Buckton as *Endeis carnosa*."

The genus *Tychea* created by Koch, with *graminis* as type, is not the same as the *Tychea* of Passerini (1860). The latter author placed *phaseoli* as type. Schouteden was the first to notice Passerini's error and he renamed the genus *Tycheoides*. I have not seen Zehntner's species *lucifuga*, but Baker states that it is so close to *squamosa* that he also abolishes Van der Goot's genus *Serrataphis* and places it as a synonym of *Geoica*.

The British species are :

Geoica squamosa Hart.

Geoica pellucida Buckton.

Geoica carnosa Buckton.

{ *Geoica setulosa* Passerini.

{ *Geoica setulosa* Buckton.

GEOICA SQUAMOSA Hart

Endeis formicina Buckton ?

Hart, 18th Rept. St. Ent. Illinois, 102 (1894) ; Buckton, Mono. Brit. Aph., IV., pl. CXXIX., figs. 1 and 3 (1882) ; Swenk, Neb. Ent. Bull., 1, 83 (1911) ; Baker, Bull. 826, U.S.D.A., 79 (1920) ; Maxon, Hemip. Conn., 318 (1923) ; Guyton, Ohio Aphid., 18 (1923) ; Tullgren, Medd., 280, f. Cent. f. försök. p. jordbruk.

Ent. avdel., 44, 38 (1925); Cutright, Bull. 387, Ohio. Agri. Exp. Sta., 24 (1925); Mordwilko, Bull. Ent. Res., XIII., pt. 1, 38 (1928).

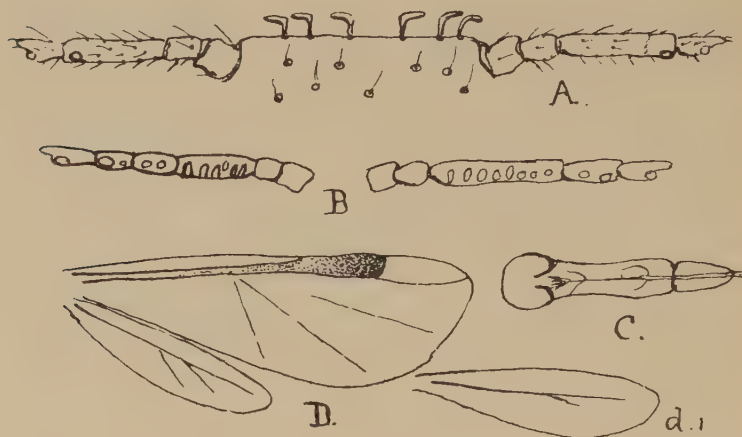


Fig. 108.—*Geocica squamosa* Hart.

A. Head and antennæ of apterous ♀; B. alate ♀ antennæ (2 forms); C. Rostrum of apterous ♀; D. and d.1. Wings.

Apterous viviparous female. Head broad, with 6 hairs in front, bent at right angles, apical bent area somewhat enlarged; short; straight ones on vertex. Eyes minute, black, of 3 facets. Antennæ of 5 segments, i. broader than ii.; iii. longest; iv. smaller than ii., scarcely defined from iii.; v. dark, a little longer than iv.; nail short and blunt, hairs straight, long and thin. Rostrum short and thick, reaching to base of second coxæ. Legs short and thick, hind pair only slightly projecting from side of body; femora and tibiæ with long hairs. On dorsum and sides of body dense, thick, short, scale-like hairs, their basal half more or less erect, near middle strongly bent back; apices of those on vertex and some on body appear flattened and expanded. Cauda with moderately long hairs and 2 pronounced round, knob-like swellings above it (seen in balsam preparations). Abdominal segmentation marked and much curved inwards on last 3 segments. Colour of spirit specimens from which the above description has been drawn up was almost white, with dusky spots and darkened legs and antennæ (Hart gives the colour as white to pale straw

pink, with mealy excretion, the entire surface with light brown points, from which arise short bent hairs).

Alate viviparous female. I have not seen this so append Hart's description: "Head and thorax blackish. Abdomen pale, with dark spots at the sides of the segments above and transverse discal bands."

Oviparous female. "Apterous, no angularly bent scale-like hairs, but long erections."

Male. "Small, more oval, abdomen less expanded, clothed with long erect hairs, less fine and more marked than in the supposed female."

FOOD PLANTS *Poa pratensis*. In America Cutright records *Capsella bursa-pastoris*; *Avena sativa*; *Phleum pratense*; *Setaria viridis*; *Triticum vulgare*; *Trifolium pratense*; *Zea mais*, etc.

ANTS' NESTS FOUND IN. *Lasius niger*; *L. mixtus*; *Formica fusca gagates*; *Solenopsis debilis* (Hart in America). *Lasius umbratus* (Buckton); *Lasius niger* (Donisthorpe).

LOCALITIES. St. Issey, Cornwall, 25 iv. 11 (Donisthorpe); Wye, v. 26 (F.V.T.); Cheviot, under dry stones formed from porphyritic rocks (Buckton); America (Hart, Cutwright); Manou, French Guinea, Africa (Silvestri).

Observations. Apparently rare in Great Britain. Our specimens exactly agree with Hart's *squamosa* from America. The very marked bent and broadened hairs at once demark it from the allied *carnosa*, whilst *pellucida* which also appears to come in this genus has simple straight, rather long hairs. According to Hart the females lay their eggs in the loose earth around the roots of plants. The ants keep the eggs during the winter and spring and from these in due time the young lice are hatched. Some lice also live during the winter at the roots of plants, in the formicaries of ants; most are viviparous and young, but the oviparous form sometimes occurs during the winter and very early spring. In winter the insects may be found wandering in the burrows of *Lasius niger*, still guarded and cared for by the ants. Those I found at Wye were on the roots of wheat and grasses and were not attended by ants.

Buckton's *Endeis formicina* has been taken to be this species. His slide in the British Museum contains four species, (1), *Forda*

formicaria ; (2), a *Geoica* with capitate hairs : (3), one *phaseolus* and (4), a *Tycheoides*.

GEOICA CARNOSA Buckton.

Endeis carnosa Buckton.

Buckton, Mono. Brit. Aphid. IV., 92 pl. CXXIX., figs. 5-8 (1882) ; Schouteden, Mém. Soc. Ent. Belg., XII., 193 (1906) ; Theobald, Ent. Mo. Mag., LXI., 81 (1925) ; Tullgren, Aphid. Studien, 39, fig. 19 (1925).

Apterous viviparous female. Varying from circular to elongated oval ; swollen ; yellowish-white to pale flesh colour (Buckton says pink). Cauda tinged with brown. Legs and antennæ slightly darker than body. Head with capitate hairs on front ; apparently varying from 4 to 6 or even more in number, 4 are in one plane, others just above and below ; these hairs vary in form, some are distinctly capitate, others fan-shaped and others boat-shaped. Head flat and broad. Antennæ of 5 segments, short and thick ; i. shorter but wider than ii. ; iii. longest ; iv. small, not quite so long as ii. ; v. short and thick, with a short, blunt nail, a little longer than iv. ; ii. with 3-6 rather thick curved hairs ;

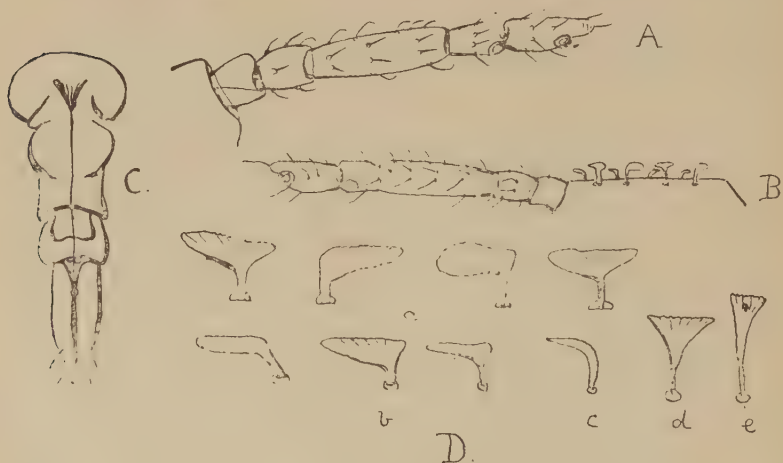


Fig. 109.—*Geoica carnosa* Buckton.

A. Normal antenna of apterous ♀ ; B. Head and antenna ; C. Rostrum ; D. Hairs ; a. Hairs of frons ; b. Side of body ; c. of antennæ ; d. and e. of body and tail.

iii. with 5 or more hairs on one side 2 on the other, and a few on the surface ; iv. with a few forming a row around apical portion ; v. with several long ones ; iv. with a small sensorium at apex ; v. with a larger one at base of nail edged with brown cilia (segment iv. in some specimens scarcely marked off by a thin septum, but seen in all by a marked basal constriction). Buckton says with 5 nearly equal segments ; but does not figure so (vide fig. 7, pl. CXXIX.). Eyes very small, black. Rostrum short and thick, but reaching nearly to base of third coxæ. Legs rather short and thick, bristly. Body with indistinct segmentation, with curled or acutely bent hairs at the sides, some boat shaped ; on the dorsum the hairs are either simple or expanded and fan-shaped apically.

Length .8 to 1.2 mm.



Fig. 110.—*Geocica carnosa* Buckton.
Apterous viviparous ♀.

FOOD PLANTS. *Avena pratensis* (roots of) (Schouteden) ; *Triticum vulgare* and other grasses (Theobald).

ANTS' NESTS FOUND IN. *Lasius flavus* ; *L. alienus* ; *L. niger*.

LOCALITIES. St. Issey, Cornwall, 25 iv. 11 ; Whitsand Bay, Cornwall, iv. 09 ; Lundy Island, 9 vi. 13 ; Bletchington, 17 iv. 13 (Donisthorpe) ; Guildford, 29 iv. 13 ; Wye, xii. 23 (Theobald) ; Ardahan, Co. Galway, 26 vi. 24 (Phillips) ; Brussels (Schouteden).

Observations. Buckton says of his specimen : " Captured in February in an ants' nest with several other aphides, including *Trama* and *Paracletus*." They had many young Woodlice (*Oniscus*)

in their company.* Buckton places *Endeis bella* Koch as possibly being the same. It seems to me to be distinct. The specimens I have seen show some variation in the structure of the hairs, which are irregular in form, none are truly capitate as Buckton says, although in certain lights under a two-thirds power they seem so. None of them show the cylindrical truncated cauda he figures (pl. CXXIX., fig. 6). One however, of Buckton's specimens in the British Museum shows this structure and is evidently the specimen he figures. The species appears to be uncommon in this country, most have been found in ants' nests. The ones I found were on the roots of wheat and some wild grasses.

GEOICA PELLUCIDA Buckton.

Endeis pellucida Buckton.

Buckton, Mono. Brit. Aph., IV., 91, pl. CXXIX., figs. 2 and 4 (1882); Theobald, Ent. Mo. Mag., LXI., 81 (1925).

Apterous viviparous female. (Buckton's description.) "Body very broad behind, narrowing to the head. Pale greenish to opaque white; much pilosity and segmentation marked. Head stained reddish. Cauda obtuse and rounded. Antennæ of 5 nearly equal segments. Legs pale and short. Rostrum short and stout. Head with rather long hairs, also body and antennæ;



Fig. III.—*Geocica pellucida* Buckton.
Head and antenna.

the latter are rather short and thick and very similar to the former species; the notch in the third segment is fairly marked.

Length of body 0.08×0.76 ."

FOOD PLANT. *Poa annua*.

LOCALITIES. Beckenham (Buckton); St. Issey, Cornwall, 25 ix. 11 (Donisthorpe); Greenhills, Co. Dublin, Ireland (Stelfox).

* Probably *Platyarthrus hoffmanseggii*.

ANTS' NESTS FOUND IN. *Lasius flavus* (Donisthorpe) ; ants' nests ? (Stelfox) ; under tufts of grass covering nests of ants (Buckton).

Observations. I have examined Buckton's specimen in the British Museum, evidently the type. It is labelled "Lubbock ? F. x." It is certainly distinct and appears from the antennæ to come in this genus. Small eyes are clearly visible in Buckton's specimen. A much damaged ♀ was sent me by Mr. Donisthorpe, which agrees with Buckton's specimen, and Mr. Stelfox has sent me a specimen from Ireland, which is identical, although there are only 4 segments to the antennæ, but iii. is slightly notched. Fig. III.

GEOICA SETULOSA Passerini.

Tychea setulosa Passerini.

Tycheoides setulosa Theobald.

Passerini, Gli. Afidi., 40 (1860) ; Theobald, Entomologist, XLIX., 50 (1916).

Apterous viviparous female. Yellowish-white to greyish-white, some creamy ; antennæ dusky, apices darkened ; legs brown ;



Fig. 112.—*Geoica setulosa* Passerini.
Apterous ♀.

rostrum dark at apex. Short, stiff hairs all round the body ; longer ones at the apex. Antennæ very short and thick, of 5 segments ; i. and ii. about equal, ii. rounded apically ; iii. the longest, often about as long as i. and ii., longer than v., iv. small,

about the size of ii. ; v. longer than iv., with small blunt nail ; all the segments with short, stiff hairs, also the head. Eyes very small black. Rostrum short and very broad, reaching past the third coxæ, apical and penultimate segments about equal. Legs

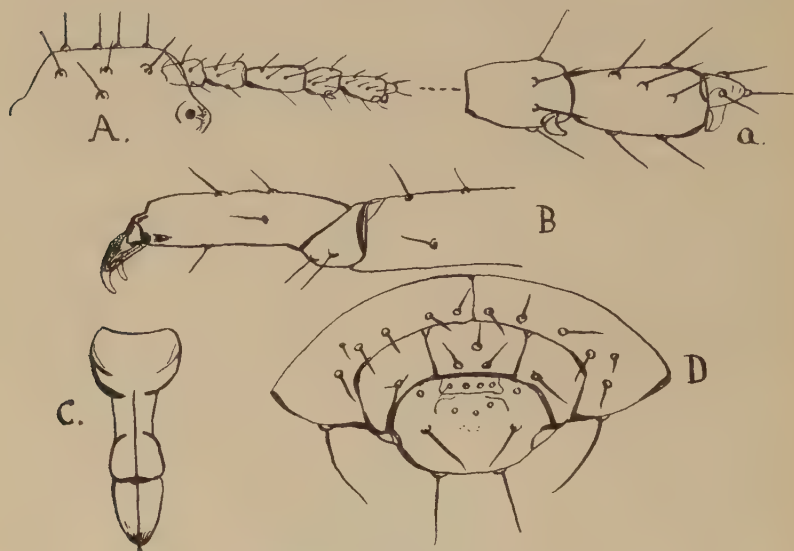


Fig. 113.—*Geoica setulosa* Passerini.

A. Head and antenna of apterous ♀ ; a. Further enlarged apex ; B. Hind tarsus ; C. Rostrum ; D. Apex of body.

very short and thick ; the femora broad, with short, stiff outstanding hairs, especially on the tibiæ. All the antennal and leg hairs more or less outstanding.

Length 1.5 to 2 mm.

FOOD PLANTS. *Setaria* sp. and *Oryza sativa* ; *Triticum vulgare*.

LOCALITIES. Porlock (Crawley) ; Wye (F.V.T.). Italy (Passerini).

Observations. A marked species owing to the stiff setæ on the antennæ and legs and around the body. The short, stumpy antennæ resemble those of *carnosa*, etc. Mr. Crawley found one in a nest of the ant, *Lasius niger*.

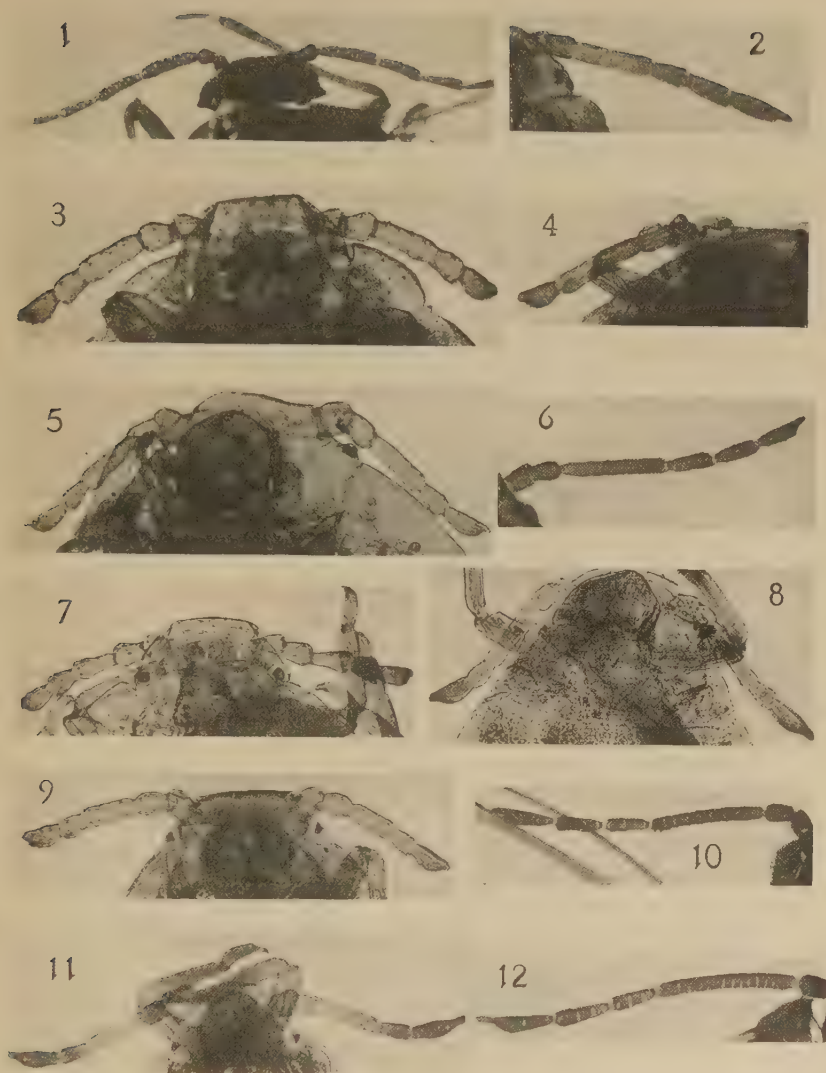


Fig. 114.—Aphides found in Ants' Nests.

1. *Paracletus cimiciformis* Heyden, alate ♀; 2. *Pemphigus bursarius*, apterous ♀; 3. *Pentaphis trivialis* Passerini, apterous ♀; 4. *Geoica squamosa* Hart, apterous ♀; 5. *Pentaphis marginata* Koch, apterous ♀; 6. *Anoecia corni* Fabricius, virgogenia; 7. *Geoica setulosa* Passerini, apterous ♀; 8. *Forda furcata* Theobald; 9. *Geoica carnosus* Buckton, apterous ♀; 10. *Anoecia corni* Fabricius, alate ♀ sexupara; 11. *Forda viridana* Buckton, apterous ♀; 12. *Anoecia corni* Fabricius, alate ♀ sexupara on *Cornus*.

GEOICA SETULOSA Buckton (non Passerini). (Sp.?)

Tychea setulosa Buckton.

Buckton, Mono. Brit. Aphid., IV., 87, pl. CXXVII., figs. 5 and 8 (1882).

I have only seen the remains of what appears to be this species, judging from Buckton's figures, sent by Donisthorpe, taken in the nest of *Myrmica laevinodis*. These lacerated remains could easily be separated from the former species by the body being tufted with hairs and also hirsute, particularly on the head and antennæ. Buckton describes the apterous female as follows: "Large, pearly white. Some are circular and domed. Vertex flat, head broad. Antennæ 5-jointed, with a round nail or button. Third joint much the longest, but there is a tendency to a constriction, which might suggest an extra joint and make Passerini's phrase 'articulis subaequa longis' more in order. Eyes merely red specks and very minute. Legs short, the hinder pair hardly protrude beyond the body. Tarsi with two claws, which fold together so as often to appear as single. Rostrum very variable in length, tip blackish. Cauda rounded. Some specimens are fuscous on the head and tail and are all mealy."

Length 1.89 mm. Antennæ 8. mm.

LOCALITY. Beckenham (Lubbock).

Observations. Lubbock found this in a nest of *Formica flavus* in April and it was described by Buckton. I do not think this tufted species is Passerini's *setulosa*. I could not trace Buckton's specimen in the British Museum, and as the only tufted specimen I have seen, sent me by Mr. Donisthorpe, had no antennæ, I mention it with much hesitation, especially when we notice that one of Buckton's figures of *setulosa* (7) resembles a *Forda* and his figure 5 a *Geoica*, but both show tufted abdominal setae.

Mr. Laing has, however, found Buckton's slide and says the specimens closely resemble *Endeis carnosa* with the discoidal hairs.

Genus PARACLETUS Heyden.

Paracletius Amyot.

Heyden, Mus. Senk., II., 294 (1837); Kaltenbach, Mono. Pflanz., 212 (1843); Amyot, Ann. Soc. Ent. Fr., Se. 2, V., 487, 543 (1843); Walker, List. Homop. (B.M.), IV., 1062 (1852);

Passerini, Aphid. Italicæ, 62 (1860) ; Buckton, Mono. Brit. Aphid., III., 64, pl. CII., fig. 4 (1880) ; Cholodkovsky, Zool. Anz., 147 (1897) ; Del Guercio, Afidi. Ital. Nuove. Relaz. R. Staz. Ent. Agri., II., 90 (1900) ; Schouteden, Aphid. Notizen, Zool. Anz., XXV., 681, 654 (1902) ; Del Guercio, Redia, II., fasc., 1, 94 (1904) ; Tullgren, Aphid. Studien, II., Medd., No., 280 f. Central f. försö. p. jordbruck, Entomo. ardel., No. 44, 46 (1925) ; Mordwilko, Compt. Rendu, d. Seanc. d. l'Acad. d. Sciences, 186, 1749 (1928).



Fig. 115.—*Paracletus cimiciformis* Heyden.
Apterous viviparous ♀.

Flattened dorso-ventrally. Eyes small. Antennæ of 5 to 6 segments, with small nail at end ; iii. longest in apterous female ; iv. and v. nearly equal. Of normal form in alatæ ; antennæ



Fig. 116.—*Paracletus cimiciformis* Heyden.
Alate ♀.

of 6 segments; iii. to vi. with sensoria, which are dense on iii. to v. Wings with marked venation (vide fig. 118). Tarsi of 2 segments, basal one small in the alatae; in the alatae the hind tarsi are somewhat elongated. Legs rather long. Rostrum of variable length in different stages. Males apterous, arostrate; narrow and more elongate than the apterous females.

A single species only found in Great Britain. It occurs frequently in ants' nests and on the roots of corn and grasses, unattended by ants.

Mordwilko has shown that the *Pemphigus pallidus* of Derbès which forms galls on *Pistacia terebinthus* is *Paracletus cimiciformis*. Probably the other species of *Paracletus*, *P. donisthorpei* Theobald from Sicily and *P. portshinskyi* Mordwilko from S. Europe, Crimea, Turkestan and Transcaucasia are also *Pistacia* gall formers.

PARACLETUS CIMICIFORMIS Heyden.

Pemphigus pallidus Derbès.

Heyden, Mus. Senk., II., 294 (1837); Kaltenbach, Mono. Pflanz., 212 (1843); Amyot, Ann. Soc. Ent. Fr., Se. 2, 487, 543 (1843); Walker, List. Homop. (B.M.), IV., 1062 (1852); Passerini, Aphid. Italicæ, 62 (1863); Derbès, Ann. Sci. Nat. Zool. (5), XI., 105, fig. (1869); Buckton, Mono. Brit. Aphid. III., 67, pl. CII., fig. 4 (1881); Wasmann, Myrm. u. Term. Art. 187 (1894); Newstead, Ent. Mo. Mag., 115 (1893); Wasmann, Tijds. v. Ent., XLI., 17 (1898); Wasmann, Zur Kennt. d. bosnischen Myrmekophilen u. Amiesen. Wiss. mitt. a. Bosnien. u. d. Herzegovina, VI., 769 (1899); Del Guercio, Nuov. relaz., Se. 1, 2, 104 (1900); Schouteden, Ann. Soc. Ent. Belg., XLVI., 136-138 (1902); Schouteden, Aphid. Notizen., Zool. Anz., XXV., No. 681, 654 (1902); Del Guercio, Redia, II., fas. 1, 90-97, pl. VIII., 1904 (1905); Evans, Ann. Scot. Nat. Hist., 24 (1906); Donisthorpe, Ent. Rec., 16 (1910); and 24 (1911); 39 (1912); 268 (1913); Mordwilko, Bull. Petrograd Dir. Sta. Protect. Plant Pests, III., No. 3 (1921); Marchal, Ann. Epiphyties, Paris, VII., 1919-1920 (1921); Schumacher, Deutsche. Ent. Zeit., 1923, pt. 4, 401-410 (1923); Tullgren, Aphid. Stud., II., Medd. No. 280, f. Central f. försök. p. jordb. Ent. avdeln, No. 44, 48 (1925); Mordwilko, Compt. Rendu d. seanc. d. l'Acad. Sci., 186, 1749 (1928).

Apterous viviparous female. Flat and oval, rather shiny, waxy yellow, clothed with short stiff hairs; the abdomen with more or less distinct* lateral paired spots. Cauda dark and bristly. Head rather flat, slightly indented in middle, with

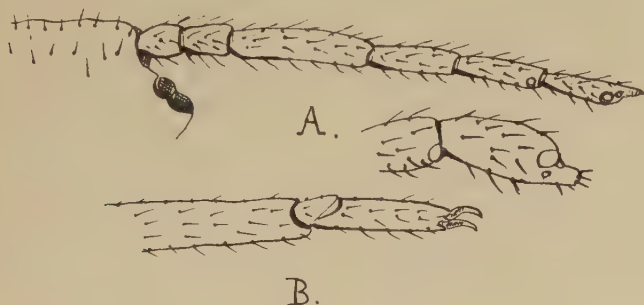


Fig. 117.—*Paracletus cimiciformis* Heyden.

A. Head and antennæ of apterous ♀; A. Apex of antenna of young ♀;
B. Hind tarsus.

short stiff hairs. Eyes, rather small, but prominent. Antennæ a little more than one-quarter the length of the body†; of 6 segments; hairy; segment i. shorter than ii.; iii. longest; iv. v. and vi. about same length; iv. wider than v. or vi., the latter with a short, blunt nail; a sensorium near apex of v. and 1 large and 4 small ones near base of nail. Rostrum reaching nearly to third coxæ. Legs rather long and thickly clothed with fine, small hairs. Tarsi of 2 segments, basal one very small. Prothorax markedly distinct; mesothorax also marked off laterally. Cauda slightly projecting.

Length 2.2 to 3 mm.

Form 2. Body globular; pro-meso- and meta-thorax sharply marked off and the cauda buried in large lateral folds of the abdomen; segmentation marked. Legs long in proportion, hind pair projecting a long way beyond the body.

Length 2.2 mm.

Alate viviparous female. Head broadened transversely and narrow, indented in the middle and slightly raised at the sides,

* Buckton speaks of it as having "a carinated abdomen and garnished with rows of small spots."

† Kaltenbach says $\frac{1}{3}$ length of body.

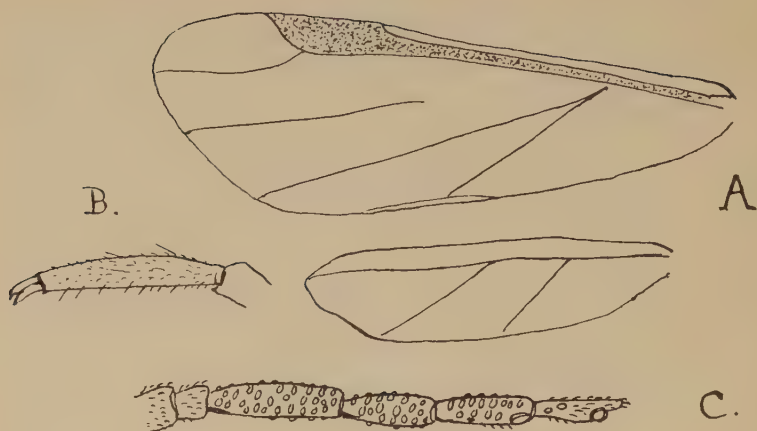


Fig. 118.—*Paracletus cimiciformis* Heyden.
A. Wings; B. Hind tarsus of alate ♀; C. Antenna.

otherwise of a general flat appearance; a deep median sulcus. Eyes black, large and prominent. Antennæ nearly as long as head and thorax; segments i. and ii. small; ii. swollen towards apex; iii. longest, thick, narrowed at base, with many (22-34) pale sensoria over whole length; iv. shorter than iii. and slightly narrower, sensoria all over it; v. shorter and much narrower than iii., sensoria all over it; vi. shorter and narrower than v., with 1-2 small sensoria at base and a large primary one at base of nail; all the segments with many small hairs; apparently very dark yellow and brown. Thorax darker than abdomen, sides pale yellowish. Legs brown, base of femora and to some extent base of tibia yellowish; hind tarsi rather long; hind tibiæ very long. Wing insertions, costa and the cubitus brown, remainder pale. No trace of cornicles.

Length 1.5 to 2 mm.

Male. Apterous, elongate oval, slightly depressed and covered uniformly with fine short hairs, segments marked; blackish. Head large, narrowed in front. Rostrum rudimentary or absent. Antennæ longer than in the apteræ, about half the length of body, elbowed at junction of segments i. and ii.; i. longer than ii.; iii. the longest; iv. and v. nearly equal; vi. longer than either iv. or v. Legs somewhat longer than in

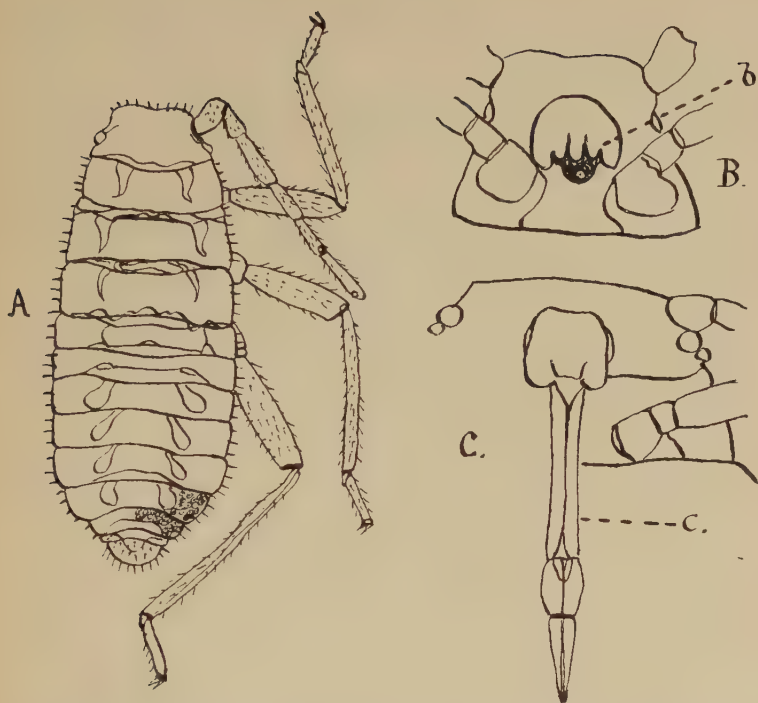


Fig. 119.—*Paracletus cimiciformis* Heyden.
A. Male ; B. Mouth of ♂ ; C. Venter of head, etc. of apterous ♀ ; C. Rostrum
(after Del Guercio).

the viviparæ and the tibia narrower. The thoracic segments broader than the abdominal.

Length 5 mm.

LOCALITIES. Oxshott Common, Surrey, v. 85 (F.V.T.) ; St. Issey, Cornwall, 25 iv. 11 ; Rame Head, Cornwall, 19 iv. 09 ; New Forest, 3 vii. 12 ; Lundy Island, 9 vi. 03 (Donisthorpe) ; Loggersheads, near Mold, N. Wales (Hodges) ; North Queens Ferry, Scotland (Evans) ; Newcastle (Hardy and Walker) ; Germany (Heyden) ; Belgium (Schouteden) ; Rheinland and Bohemia (Wasmann) ; Italy (Del Guercio) ; Central Europe and Poland (Mordwilko) ; France (Marchal).

Wasmann says it is very common over the whole of Central Europe in the nests of the ant *Tetramorium cæspitum*.

PLANTS FOUND ON. *Festuca duriuscula* (Passerini); *Gramineæ* (Marchal, Schouteden). *Pistacia* (Mordwilko, Derbès).

ANTS' NESTS FOUND IN. *Formica rufa* (Heyden, Del Guercio, Buckton, Theobald); *Tetramorium cæspitum* (Wasmann, Schouteden, Donisthorpe); *Lasius flavus* (Newstead, Evans).

Observations. This appears to be a true Myrmecophilous Aphid, but at the same time may be found on the roots of grasses, etc., unattended by ants. Donisthorpe says it is common where he found it in Cornwall and that *Tetramorium cæspitum* is undoubtedly the true host. Wasmann (Tidschr. v. Ent., XLI., 17, 1898) says that Buckton named for him *Paracletus* as *Tychea setariæ* and he also considers that the ant *T. cæspitum* is its normal host. Schouteden considers that this is the only true myrmecophilous aphid. Heyden found 50 in one nest in April and considered that they had passed the winter in friendly relations with the ants. Walker (List. Homop., IV., 1062) mentions a winged form, but he does not describe the antennæ. I do not think this refers to *Paracletus* at all. The alate are very marked both as regards antennæ and wings. The apteræ seem to vary much in shape; the typical form is *Cimex* like; but others have a totally different form; the antennæ legs, etc., however, exactly agree. Del Guercio (Redia, II., fas. I., 90, pl. VIII., figs. 1-7) was the first to describe the male and his figure is reproduced here. The apteræ like the *Tramini* and many *Lachnini* salute the ants with their hind legs.

Donisthorpe noticed when finding this species that it occurred in the galleries of *Tetramorium cæspitum* at large near the surface and that when the nests are disturbed it runs for safety down into the underground chambers. Schouteden first described the alate female in 1902 (Zool. Anzeiger., No. 681, p. 654, Sep. 15).

Walker (List. Homop., IV., 1062) describes a variety as follows: "Pale red, triangular, very narrow in front, feelers one-sixth of the length of the body; nectaries black, level with the surface of the abdomen; legs short. Found by Mr. Hardy near Newcastle under stones with *Schizoneura corni* and *Rhizoterus vacca*."

Buckton's specimens in the British Museum are all *Anæcia corni*. This determination agrees with his figure Plate CII., fig. 4 says Mr. Laing. This subterranean aphid which feeds on

the roots of corn and grasses, does some damage to the corn in Continental Europe.

It has recently been shown by Mordwilko to be the same as the *Pistacia* gall aphid described by Derbès as *Pemphigus pallidus* on *P. terebinthus*. He records the sexuparae on the trunks of *P. mutica*, whilst the galls of *pallidus* occur in the Balkans on *P. terebinthus*.

Mordwilko describes a second species as *P. portchinskyi*. Schumacher considers this to be only a race of *cimiciformis*. A third species, with antennae of only 5 segments, I described from Sicily as *Paracletus donisthorpei*.

Genus TRIFIDAPHIS Del Guercio.

Tullgrenia Van der Goot.

Del Guercio, Revista. Patol. Vegetale, n.s., III., 332 (1909) ; Gillette, Pomona. Journ. Ent., I., No. 3, 75 (1909) ; II., No. 3, 283 (1910) ; Van der Goot, Tijdschr. v. Entom., LV., 96 (1912).

Antennae of alatae of 5-6 segments ; ii. considerably longer than i. ; sensoria on iii. only, round to elongated oval ; antennae of apterae of 5 segments ; ii. much longer than i., in some cases nearly as long as iii. Wing venation much as in *Pemphigus*, media of forewings simple ; the two obliques of hind wings unite or nearly so. Cornicles absent. Wax glands present. Subterranean species and gall formers.

One species occurs in Great Britain :

Trifidaphis phaseoli Passerini.

This genus was founded on Gillette's *Pemphigus radicolica*, a very variable species, some alatae having antennae of 5 segments, others of 6 segments and the shape of the sensoria vary, as shown by Gillette in 1910.

The genus is demarked by the long second antennal segment seen in both the type species of *Trifidaphis* and the type species of *Tullgrenia* (*phaseoli*). The genus appears to me to come intermediate between the *Prociphilini* and the *Fordini*. Gillette placed this genus with *Pentaphis* in a separate tribe—the *Pentaphidi*.

TRIFIDAPHIS PHASEOLI Passerini.

Tychea phaseoli Passerini.*Tullgrenia phaseoli* Van der Goot.*Tychea perniciososa* New.*Tychea groenlandica* Rübsaamen.*Amycla albicornis* Koch ?*Pemphigus globosus* Walker ?

Passerini, Gli. Afidi., 39 (1860) ; Aphid. Ital., 81 (1863) ; Buckton, Mon. Brit. Aph., IV., 90, pl. CXXVIII. (1882) ; Rübsaamen, Zool. Ergebr. d. v. Dryg. ausgesandten Grönlandespdl., VIII. (1898) ; Lugger, Bull. 69, Ent. Div. Uni. Minn. Agri. Exp. Sta., 152 (1900) ; V. der Goot, Tijds. v. Ent., LV., 96 (1912) ; Holland Blattläuse, 514 (1915) ; Theobald, Entomol., LI., 95 (1918) ; Bull. 2, S.E. Agri. Coll., 11, 12, figs. 8 and 9 (1922) ; Tullgren, Aphid. Stud., II., 40, fig. 21 (1925) ; Willcocks, Ins. and Rel. Pests of Egypt, II., 125, pl. IV., figs. 9-11 (1925) ; Walker, List. Homop. (B.M.), IV., 1057 (1852) ; Koch, Die Pflanz., 305, figs. 373, 374 (1856) ?

Alate viviparous female. Head dull black ; hairs pale. Eyes black. Antennæ with segments i., ii., and iii. black ; iv. v. and vi. paler, smoky in colour ; posterior part of head may be obscure greenish-grey. Pronotum with anterior edge dark, darker still on sides ; posterior part greyish-green ; meso- and meta-notum black. Abdomen dull orange-green, a median longitudinal irregular brown area, extending from segment iii to apex ; this brown area is not regular and shades into brown specks at the margins ; posterior margins of basal segments distinctly green ; apex dark ; anal plate black ; venter more or less obscure orange ; slightly farinose, the mealy matter white ; sternal plate black. Rostrum reaching to second coxæ ; the two apical segments black base black, middle pale. Legs : fore-legs black ; hairs pale ; mid and hind black, except apices of femora, which are grey. Wings with costa dark, smoky ; cubitus blackish ; stigma smoky. Veins smoky ; insertions pale ; in second pair the cubitus is ochreous and the obliques pale. Wings iridescent in certain lights. When mounted in Canada balsam the abdomen shows darker transverse bars behind and fine small, dark spots each side. Antennæ shorter than head and thorax, of 6 segments ; i. small ; ii. more than twice as long as i., the apex more or less rounded ;



Fig. 120.—*Trifidaphis phaseoli* Passerini.

A. Wings of alate ♀; B. Head and antenna; C. Apex of body; D. Antenna of apterous ♀; E. Hind leg of apterous ♀.

iii. small, but slightly longer than vi., with 8 sensoria, 4 large, the others smaller; iv. about as long as v. and as long as ii., with 2-3 sensoria near apex; v. with normal primary; vi. with short blunt "nail" and normal primary sensorium at base: all segments with fine, rather long hairs. Cauda small, semicircular, with short, fine hairs. Anal plate with longer hairs. Tibiæ and tarsi with many fine hairs; one large one at apex of femora.

Length 2.0 to 2.5 mm.

Apterous viviparous female. Globose, bright yellowish-buff to almost white, covered with white meal, sometimes scanty, at others sufficiently thick to give the insect a white miller-like appearance. Cephalic hairs numerous. Head mealy, brownish. Eyes black, very small. Antennal segments i. and ii. ochreous; iv. and v. smoky or v. only smoky; some have the antennæ all smoky in colour. Thorax and abdomen uniform yellowish-buff to white; many pale hairs on the body. Venter the same colour as the dorsum; mealy. Legs ochreous to pallid ochreous-brown. the knees slightly darkened; tarsi dark. Antennæ shorter than the head and thorax, of 5 segments; i. a little smaller to much smaller than ii.; iii. about as long as or a little longer than v.; iv. small, about half of v., primary sensorium normal; v. with very small blunt "nail"; all segments hairy. Rostrum pale, apex dusky, reaching just beyond second or to third coxæ; acuminate, apical segment longer and slightly narrower than penultimate,

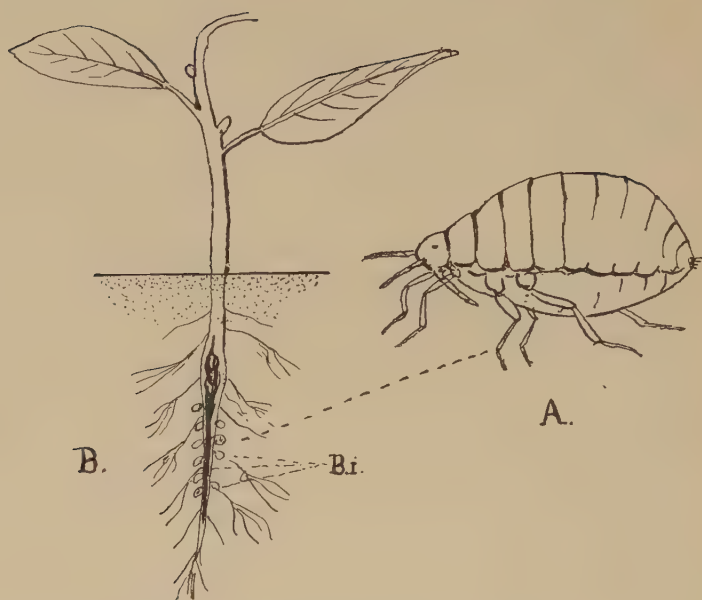


Fig. 121.—*Trifidaphis phaseoli* Passerini.

A. Apterous ♀; B. Attacked root; B.i. Apterous ♀♀ on root.

with many hairs. Legs rather short and thick; fore femora and tibiæ nearly equal; in hind legs, the tibiæ slightly longer; mid pair a little nearer to hind than to front pair; femora, tibiæ and tarsi hairy. Apex of body densely hairy.

Length 1.5 to 2.5 mm.

Larva. First instar bright orange; eyes black. Legs and antennæ colourless; very glossy; hairs pale; coxæ orange. Head dusky, a fine median line, halving the dusky area, which does not extend over the entire upper part of the head; at the sides around the eyes and base of antennæ the head is orange. The dusky area extends back to the pronotum, which has 2 lateral dusky areas, all three, however, paler than the large central dusky area of the head. Eyes black, very small. Antennæ pale; segment vi. pale smoky. Thorax and abdomen bright rich orange; hairy; venter orange. Rostrum reaching well beyond third coxæ, apex dark, pale in middle. Legs pale, including the tarsi; claws dark.

FOOD PLANTS. *Phaseolus vulgaris* ; *P. coccineus* ; *Fabia* spp. , *Brassica oleracea* ; *Euphorbia lathyris* ; *Amaranthus græcizans* ; *A. retroflexus* ; *Solanum tuberosum* ; Turnip roots ; Gladiolus bulbs ; Grass roots ; *Pistacia mutica* and *P. terebinthus*.

LOCALITIES. Wye, 17 ix. 19 ; 14 vii. 21 ; Hastings, 7 vii. 10 ; Fowey, 14 v. 13 (F.V.T) ; Walthamstow (Buckton) ; York ; Shalford ; Oxford ; Reading ; Newbury ; Chelmsford ; Criccieth (F.V.T.) ; Reigate (Chapman) ; Rothamsted (Davidson). Gloster, King's Co., Ireland (Stelfox) ; Wisley, Surrey, on roots of *Heliotropium peruvianum* ; Plymouth, in the nests of *Acanthomyops aliena* ; New Forest ; Birmingham (Laing) ; Egypt (Willcocks) ; Italy (Passerini) ; France ; Taormina, Sicily, 7 iv. 26 (Donisthorpe) ; Mordwilko gives Turkestan as its Eastern limit ; America (Garman, Lugger, etc.).

Observations. A fairly common and widely spread species, which now and then does much harm to French, Broad and Scarlet Runner Beans, especially when young. The apteræ cluster on roots and the stalks under the ground and cause them to become black and to decay. Attacked plants are stunted in growth, irregular in form and produce no pods. Specimens from Egypt agree with those found in England. Willcocks states that in Egypt the alatae are produced in great numbers from large colonies on bean roots at Ghezireh. Lugger, partly quoting Garman, says it is quite destructive to cultivated beans in gardens near Lexington, Kentucky, and that it clusters on the roots and root stalks just as it does in this country. He also says that "Wherever they appear we find little hills of loose earth near the plants, due to the presence of small brown ants, who take care of their 'cattle,' even carrying them away when the plants are taken up. It is globose," he says, "in shape, and has the body clothed everywhere with short, erect pubescence. Living specimens are white, owing to a coat of waxy material, but if this coat is removed it is seen that the real colour is pale yellow, nor is this waxy material found in the young lice, which have a glossy honey-yellow colour ; the tips of the feelers and the tip of the beak, as well as much of the legs are dusky."

Garman recommends the use of ground-up tobacco stems to be scattered liberally along the furrow in which the beans are planted. Buckton says it is sometimes numerous on the roots

of the Scarlet Runner (*Phaseolus coccineus*) and also occurs on the French Bean (*P. vulgaris*). This insect was also found by Dr. Chapman on potatoes. He sent me specimens with the following note on July 31st, 1921: "The aphides seem to live comfortably in the old seed potatoes, but not so abundantly as on the stems of the tubers and their rootlets. A plant seriously attacked, somewhat suddenly, from an appearance of health, droops its leaves as if suffering from drought, or as if the branch had been cut off." It also occurred in my own garden in the same year on potatoes. All those I found were on small stunted plants, with very few tubers of small size. On the other hand, Dr. Chapman found some on a hill of a wilted Up-to-Date plant which had a very fair show of tubers.

Mordwilko has recently shown that sexuparæ occur in the South of France on *Pistacia terebinthus* (*-perniceosus* New.), whilst the galls occur on *Pistacia mutica* which does not occur in France.

If Walker's *P. globosus* is this insect, then his name takes precedence over Passerini's. I think Koch's *Amycla albicornis* is the same. Any way the records I made of it apply to *phaseoli*. I can see no difference, except in size, between the specimens from ants' nests sent me from Ireland by Mr. Stelfox, and by Mr. Donisthorpe from the nests of an ant *Aphænogaster pallidula* from Sicily.

The relative size of the second antennal segment varies a good deal, in some it is nearly as long as segment iii., but always much longer than ii. The specimens sent by Mr. Stelfox have particularly long second segments.

Tribe MELAPHIDINI.

This tribe according to Baker is suggestive both of the *Pemphigini* and the *Eriosomatini*. The typical host group he says is *Rhus* and the galls are typically fall galls. The exact position cannot be given until the sexuparæ are found. They are normally gall inhabiting forms during part of their life and have no cornicles; the antennæ of the alate viviparæ are of 5 or 6 segments, and he says, provided with oval or linear transverse sensoria. In typical *Melaphis* the sensoria resemble those of *Eriosoma*.

Four genera are placed by him in this Tribe, *Aploneura*, *Melaphis*, *Nurudea* and *Pemphigella*.

The only genus found in Great Britain is *Aploneura*, and I propose to remove this genus to a separate Tribe, the *Aploneurini*

Baker gives the following key :

1. Both media and cubitus present in hind wings. 2
Only media in hind wings. *Aploneura*.
2. Stigma of forewings pointed on distal portion and extending some distance. *Melaphis*.
Stigma stopping abruptly on distal extremity. 3
3. Antennæ of 5 segments. *Nurudea*.
Antennæ of 6 segments. *Pemphigella*.

Mordwilko correctly places *Pemphigella* in the *Fordini* and *Nurudea* is quite distinct in sensoriation from the genus *Melaphis* and must be excluded from this Tribe.

Tribe APLONEURINI.

Antennæ of alate viviparæ of 6 segments, with a single large sensorium rounded and irregular at the apices of segments iii. to v. and a large rather elongate primary one on vi. ; nail small ; antennæ of the apterous viviparæ of 5 segments ; i. to v. being nearly equal ; vi. much the longest. The wax glands well developed. In the hind wings the media only is present.

The type species is *Aploneura lentisci* Passerini, an aphid which forms galls on the *Pistacia* and which also lives on roots in the soil.

Genus APLONEURA Passerini.

Tetranema Derbès.

Passerini, Aph. Italicæ, 78 (1863) ; Derbès, Ann. d. Sc. Nat. Zool. (3), II, 106, pl. 4, figs. 20-21 (1869).

Cornicles absent. Alate female with fore wings with simple media, cubitus and anal joined near their bases ; hind wings with only the media present ; antennæ having 6 segments, with large sub-circular sensoria, one to each segment. Stem mother and apteræ with antennæ of 5, almost equal segments. Living in galls and on the roots of plants. Type of genus *Tetraneura lentisci* Passerini.

APLONEURA LENTISCI Passerini.

Tetraneura lentisci Passerini.

Tetranema lentisci Derbès.

Rhizobius graminis (Buckton ?) Theobald.

Passerini, Aphid. Ital., 78 (1863) ; Derbès, Ann. d. Soc. Nat. Zool. (3), II., 106, pl. 4, figs. 20-21 (1869) ; Baldrati, Nuovo. Giorn. Bot. Ital., 30, 58, pl. 1, 10 (1900) ; Trotter and Cecconi, Cecidotheca Italica, iii., No. 74 (1901) ; Stefani, Nuovi. Ann. Agri. Sicil., Palermo, 30-31, fig. 8 (1902) ; Tavares, Broteria, IV., 41-42, VIII., 20 (1905) ; Theobald, Bull. Ent. Res., VI., Pt. 11, 151, fig. 38 (1915) ; Willcocks, Sult. Agri. Soc. Bull. I., 58 (1922) ; Insect Pests of Egypt, II., 122, pl. VII., figs. 1-6 (1925) ; Hall, Min. Agri. Tec. Se., Egypt. Agri. Dept. Bull. 68, 47 (1926).

Alate viviparous female. (Sexupara). Head, antennæ thoracic lobes and legs black ; rest of body olivaceous-green, yellowish-green or dull yellowish-green. Head small, narrow in front, slightly indented in middle. Eyes large black. Antennæ not so long as head and thorax, of 6 segments, with pale bands at junction of segments ; i. small and irregular narrower than ii., which is semi-globular ; iii. slightly longer and narrower, constricted at base, with 1 large rounded or oval sensorium at apex ; iv. same length or slightly shorter than iii., of similar form and with a large irregular oval sensorium at apex ; v. from the same size as iv. to a little longer and narrower, of very similar shape.

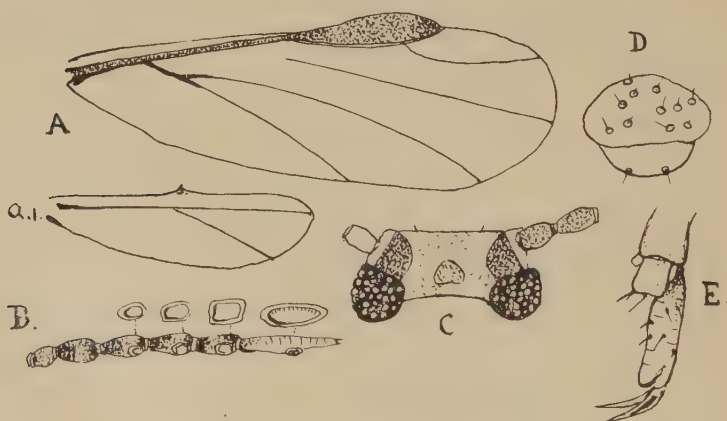


Fig. 122.—*Aploneura lentisci* Passerini.

Alate viviparous ♀. A. and a.i. Wings ; B. Antenna ; C. Head ; D. Cauda and anal plate ; E. Tarsus.

with a large, more or less quadrangular sensorium at apex ; vi. longest, with a thick, blunt " nail " and a large elongate oval sensorium at its base, fringed on inner border ; a few short hairs at apex. Rostrum short and thick, reaching to or just beyond second coxæ. Legs rather short, scanty tibial hairs, a few on apices of femora and some on the tarsi ; first tarsal somewhat quadrangular in form, ungues normal. Wings iridescent, with yellowish-green insertions and dusky costa ; stigma ochreous, the margin bottle green ; veins smoky, with smoky pigment outlining them ; longer than body, venation of front wings with simple media ; hind pair with media and cubitus as a rule, but now and then the cubitus is absent. Cauda and anal plate dusky, both rounded, with a few hairs. Body nude. Wax glands present. Venter ochreous-green, farinose laterally ; prosternum smoky green ; sternal plate black. Covered with long white filaments when fresh.

Length 1.8 to 2 mm.

Apterous viviparous female. Dull ochreous yellow, pale creamy buff to greyish-yellow. Legs, head and antennæ dusky-brown to smoky. Elongate oval. Usually covered with fine meal and wool. The small head is rounded in front. The very short antennæ of 5 segments, the first four nearly equal ; i. and ii. broader than iii. and iv. ; v. longest, about as long as iii. + iv. and narrower ; a large sensorium at base of iv. and 2 at base of " nail." Rostrum short and thick ; the 3 segments nearly equal in length, reaching to, or nearly to, second coxæ. Legs very short and thick ; tibiæ a little shorter than femora ; tarsi of 2 segments ; claws normal. Eyes small. Two brownish lines on the head and some other dark marks. Abdomen deeply ringed, with dusky spots in transverse rows (not always visible) ; in some a small dorsal line. From the dusky spots, which are wax glands, a fine white flocculent wool is passed out.

Length 1.5 to 2 mm.

Larva. Antennæ relatively much shorter and thicker, of 4 segments ; a prominent sensorium at apex of segments iii. and iv., and a few scattered hairs.

FOOD PLANTS. Roots of various grasses and of wheat ; *Pistacia lentiscus* ; *Dactylis* ; *Anthoxanthum* (Grandi).

LOCALITIES. Littlestone, Kent, ix. 21; Wye, ix. 23, on grasses (F.V.T.); Egypt (Willcocks, Hall); Italy (Passerini macchiati); Monte Carlo, 4 ix. 24, on *Pistacia* (in Brit. Mus.).

Observations. This insect I have only found twice in England in both instances alate females. The first I found were flying about on the sandhills at Littlestone; they were very marked objects owing to the long strands of white wool attached to them and were often seen sticking onto the Marram grass growing on the sandhills. One I brought away alive produced her young on the soil. Two I found at Wye were settled on rough grass growing on the primæval Down side. I cannot separate them from the Egyptian specimens I have. Willcocks found it feeding on the roots of wheat and hatched out the alatae. Hall also took it in Egypt and says that the alatae were present everywhere and that on April 7th the counterpane of his bed was quite black with them. I described this insect as possibly being Buckton's *Rhizobius graminis*. Mr. F. Laing finds that it is the same as the *Pistacia* Nut Gall Aphid, the *Aploneura lentisci*. As *Pistacia* does not grow in England, it is strange finding it here, but like the Woolly Aphid of the Apple and Elm, it must live, as that species does in some parts of the world, without its primary host plant and exists with us only on the roots of grasses, etc., just as *Tetraneura ulmifoliae* does in Asia, without any sexual Elm stage, that is, there is no gall-forming generation. Remains of *Pistacia* are found in England in the Bagshot beds.

Tribe PROCIPHILINI.

This tribe has no cornicles, but wax glands are well developed. Antennæ of alatae rather long and slender, of 6 segments and provided with narrow transverse, nearly annular sensoria, but sometimes almost oval in form. Antennæ of Stem Mother of 5 segments. Wax glands occur on the head, thorax and abdomen.

The insects live in pseudo-galls, made of leaf tufts or bent leaves. Many are large species and are densely covered with wool in the adult stage.

Baker recognises four genera, which tabulate as follows:

1. Media once forked. Stem mother usually without wax plates. *Asiphum*.

Media simple. Stem mother with several rows of wax plates. 2.

2. Wax plates large, those on thorax well developed. Stem mother and offspring living together. 3.

Wax plates not well developed. Stem mother usually in a gall by herself. *Thecabius*.

3. Sensoria narrow, linear, ciliate. *Prociphilus*.

Sensoria somewhat oval, non-ciliate. *Neoprociphilus*.

Three genera occur in Great Britain, *Thecabius*, *Prociphilus* and *Asiphum*.

Genus ASIPHUM Koch.

Schizoneura Kaltenbach.

Koch, Die Pflanzenläuse, 246 (1857); Kaltenbach, Mono. Pflanz., 107 (part), (1843); Lichtenstein, Mono. d. Pucerons d. peupliers (part) (1886); Gerstaecker, Bericht, f. 1857, 249 (1859); Kirkaldy, Canad. Ent., 37, 148 (1905); Tullgren, Arkiv. f. zoologi., V., 14, 63 (1909); Baker, Bull. 826 U.S. Dept. Agri., 75, pl. XII., R-X (1920).

Cornicles absent, stem mother with antennæ of 5 segments; antennæ of alatae of 6 segments, with a few rather narrow transverse sensoria. Wax plates present in the alatae. Fore wings with the media once forked; hind wings with both media and cubitus present.

Two species are known in Europe:

1. *Asiphum tremulae* De Geer.

2. *Asiphum ligustrinellum* Koch.

The first species occurs in Great Britain. These insects crumple up the leaves of the host plants.

ASIPHUM TREMULÆ De Geer.

Aphis tremulae De Geer.

Aphis populi Fabricius.

Schizoneura tremulae Kaltenbach.

Asiphum populi Koch.

De Geer, Mém. pour servir a l'hist. d. Ins., III., 94, pl. VII., figs. 1-7 (1773); Linnæus, Fn. Suec., Ed. II., 261, 997, (1761); Fabricius, Ent. Syst., IV., 215, 27 (1794); Kaltenbach, Mono. d. Pflanz., 171 (1843); Koch, Die Pflanz., 246, fig. 323 (1857); Lichtenstein, Mono. d. pucerons d. peupliers, 37 (1886);

Schouteden, Ann. Soc. Ent. Belg., XLVII., 182, 16 (1903); Tullgren, Arkiv. f. Zoologi, V., 14, 63, figs. 19, 20 and 21 (1909); Tullgren, Aphid. Stud., II, 11 (1925).

Alate viviparous female. Head and thorax blackish-brown. Abdomen rusty-brown to rusty-red, with whitish down. Legs and base of antennæ yellowish, rest of antennæ brown and the apices of femora, tibiæ and tarsi. Antennæ about as long as head and thorax, of 6 segments; i. and ii. about equal, latter if anything slightly the longer; iii. with 7 to 11 rather elongate narrow sensoria; iv. about as long as v. or slightly shorter, with 1 to 3 similar sensoria, near apex; v. with a much larger irregularly shaped round sub-apical sensorium; vi. a little longer and narrower than v., with a short blunt flagellum and an irregular round

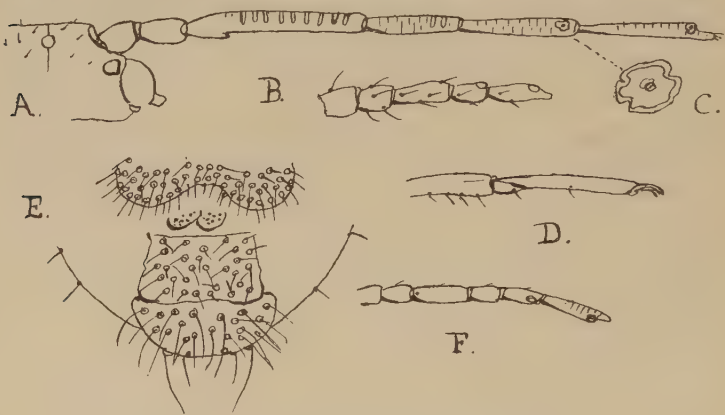


Fig. 123.—*Asiphum tremulæ* De Geer.

A. Alate ♀ head and antenna; B. Antenna of fundatrix; C. Enlarged primary sensorium; D. Hind tarsus; E. Apex of alate ♀ body; F. Larval antenna.

sensorium at its base, a few spines at the apex; there is a marked but small notch at base of iii.; iii. to vi. are imbricated. On head are three marked stemmata and many small hairs. Eyes large; ocular processes large. Rostrum reaches to second coxæ; apical segment acuminate. A few stiff hairs on the body. Legs moderately long and thick; hairs on the tibiæ and a few on tarsi. Median vein in fore wings forked; hind wings with media and cubitus. Anal plate rounded.

Length 3.3 to 3.9 mm.

Apterous viviparous female (Fundatrix). Dark silvery grey, with darker transverse markings and the antennæ of 5 segments. As I have not seen mature specimens I append Tullgren's description :

“ *Farbe*. Lebend dunkel silbergrau, mit einigen mehr oder weniger deutlichen dunklen, transversalen, Rückenbinden durch Faltung entstanden. In alkohol ist das Tier gelb-braun mit schwarzbraunen kopf und bisweilen etwas helleren Beinen. *Morphologische Merkmale*. Der Körper ist ungewöhnlich gross, stark gewölbt, unten flach. Das Integument zeichnet sich durch die ungewöhnlich reiche und dichte Bekleidung von verhältnismässig langen und sehr feinen Haaren aus. Am kopfe findet man keine Längsfurche und der Scheitel ist zwischen den Fühlern ca. 3 mal so breit wie das eiste Glied. Die antennen sind 5 gliedrig und sind im Verhältnis zum Körper ausserordentlich kurz, ragen kaum über den Hinterrand des Prothorax hinaus. Die zweiersten Glieder sind gleich lang, das zweite bedeutend schmaler. Das dritte glied ist ungefähr $1\frac{1}{2}$ mal so lang wie das zweite, $\frac{1}{4}$ kürzer als das fünfte und sechste glied zu sammengenommen. Dar fünft glied ist erheblich kürzer als das zweite und ca halb so lang wie das sechste. Die Behaarung ist spärlich und lang Körnchenreihen kommen wenigstens an den Gliedern 4 und 5 vor. Die letzgenannten besitzen je ein sehr kleines, apikales Rinarium. Der Rüssel sehr kurz, 2. u. 3 glied fast gleich lang. Die Beine sind kurz und kräftig. Tibia III nur. ca. 6 mal so lang wie breit, ca. 3-mal so lang wie die zienlich stark gebogenen Tarsen. Tie Tibien besitzen sehr gut entwickelte Sohlenbläschen. Die Behaarung ish sehr spärlich. Körnchenreihen kommen an den Beinen kaum vor. *Masse*. Körperlange 5.6 mm.”

FOOD PLANTS. Aspen (*Populus tremulæ*).

LOCALITIES. Conecis Falls, Evanton, Ross-shire, N.B., 21 vi. 14 and vii. 22 (D. J. Jackson) ; Sweden (Tullgren) ; Belgium (Schouteden) ; Germany (Kaltenbach, Koch, etc.).

Observations. The only British specimens I have seen were sent me by Miss D. J. Jackson. This aphid crumples the Aspen leaves and can easily be detected by the white wool it produces. The insects also occur on the leaf stalks and twigs, which they cover with white meal, etc. Laing has once come across it in the Den of Maidencraig, near Aberdeen.

Genus THECABIUS Koch.

Pemphigus Passerini, Kessler, etc.*Bucktonia* Lichtenstein.*Brysocrypta* Schouteden.

Koch, Die Pflanz., 294 (1857); Passerini, Aphid. Ital., 70 (a.p.) (1863); Kessler, Ber. d. Vork. f. Naturk. zu Kassel (a.p.) (1852); Lichtenstein, Mono. d. Pucerons, 16 (1886); Del Guercio, Nuov. relaz., Ser. I., 2, p. 95 (a.p.) (1900); Schouteden, Ann. Soc. Ent. Belg., XLVII., 137 (a.p.) (1903); Schouteden, Ann. Soc. Ent. Belg., XII., 197 (a.p.) (1906); Mordwilko, Ann. d. Mus. Zool. d. l'acad. Imp. d. sc. de St. Petersburg, 367 (a.p.) (1908); Tullgren, Arkiv. f. Zoologi., 5, No. 14, 102 (1909); Van der Goot, Beit. z. Kennt. d. Holländischen Blattläuse, 456 (1915); Baker, Bull. 826, U.S. Dep. Agri., 77, pl. XIII., O.U. (1920).

Cornicles absent. Wax plates present but not prominently developed as in *Prociophilus*. The stem mother has antennæ of 5 segments and the sensoria are rather narrow, not fringed. Fore wings with media simple; the hind wings with both media and cubitus. The sexual forms are small and arostrate. The oviparous females developing only one ovum.

They live in galls, the stem mother usually living in a gall by herself.

The genus is based on the *affinis* of Kaltenbach. Baker says that certain species such as *patchii* Gillette do not show the typical life habit of the stem mother living in a gall alone.

THECABIUS AFFINIS Kaltenbach.

Pemphigus affinis Kaltenbach.*Pemphigus ranunculi* Kaltenbach.*Thecabius populneus* Koch.*Buctonia affinis* Lichtenstein.*Amycla fuscicornis* Koch?

Kaltenbach, Mono. Pflanz., 182, 185 (1843); Walker, List. Homop. (B.M.), IV., 1055, 1852 and Supp. 302 (1858); Koch, Die Pflanz., 295, fig. 364 (non *affinis* Koch = *spirothecae* Pass.) (1857); Passerini, Aphid. Italica., 74 (1863); Courchet, Mém. Acad. d. Montpellier, 50, 94, pl. V., fig. 1 (1879); Kessler, Ber. d. ver. f. Naturk. z. Kassel., 53, pl. III., figs. 1-8 (1882); Lichtenstein, Mono. d. Pucerons, 19, Pl. II., figs. 4-5 (1886); Rübsaamen, Die

Gallmucken u. Gallen d. Siegeslandes, Bonn. Verh. Nat. Hist. Ver., 45, 20, 141 (1890); Del Guercio, Prosp. dell' afido fauna italica, 97 (1900); Schouteden, Ann. Soc. Ent. Belg., XLVII., 185, 47 (1903); Schouteden, Mém. Soc. Ent. Belg., XII., 200 (1906); Mordwilko, Biol. Zentralbt. XXVII., 770 (1907); Tullgren, Arkiv. f. Zool., v. 14, 103 (1909); Davidson, Journ. Eco. Ent., 372, fig. 28 (1900); Theobald, Ent. Rec., 50 (1913); Van der Goot, Holl. Blatt., 456 (1915).

(Walker places as possible synonyms the following: *Aphis polyanthis* Sulz.; *Aphis graminis* Reaum.; *Aphis radialis* Fonscolombe; *Eriosoma lactucae* Mosley; *Pemphigus lactucae* Westwood and the *Aphis* of the China Aster.)

Apterous viviparous female (Fundatrix). Pale green to greyish green, with white meal. Head, antennæ and legs dark brown. Oval to slightly elongate oval in form, with some small fine hairs. Wax plates prominent. Antennæ of 5 segments; segment i. wider, but no longer than ii.; iii. longest, about as long as iv. + v.; iv. shorter than v., with a small round sub-apical sensorium; v. about $1\frac{1}{2}$ times as long as iv.; nail very short and blunt; a few hairs on i., ii. and iv. Rostrum rather short and thick, with a few hairs on apex, reaching to second coxæ; apical segment a little shorter than the penultimate. Legs somewhat short and thick, with a few hairs.

Length 4 to 4.5 mm.

Alate viviparous female (Fundatrigenia). Head and thorax dark, the latter somewhat shiny. Abdomen green to purplish-



Fig 124.—*Thecabius affinis* Kalt.

A. Antenna of Fundatrix; B. of Fundatrigenia; C. of Sexupara; D. of Virgogenia.

green, dusky at apex. The wax plates well developed. Legs and the antennæ dark. Antennæ of 6 segments; i. a little larger than ii.; iii. the longest, about as long as iv.+v., with 12-20 annular sensoria; v. nearly as long as vi., with 6-9 sensoria and a sub-apical primary one; vi. with very short blunt "nail," with some short terminal bristles and 3-4 small narrow irregular sensoria and a large fringed primary one at base of "nail." Rostrum reaching to or just beyond second coxæ. Legs long and thin.

Length 2.6 to 3 mm.

Virgogenia (ranunculi). Yellowish, yellowish-grey to dirty pallid green, with much white flocculent matter; apex dusky. Head dusky. Antennæ and legs shiny, dark brown to almost black on legs. Oval to elongate oval in form; a few short hairs. Wax plates marked. Antennæ rather long, of 6 segments; i. a little shorter than ii.; iii. longest, with 5 hairs on one side; iv. same length to a little longer than ii.; from half to two-thirds of v.; v. about as long as vi., with terminal primary sensorium; nail short, a few terminal hairs and a large irregular round sensorium at base; a marked hair at apex of v. and a few on i. and ii. Rostrum reaches to about second coxæ, apex dark. Legs rather long.

Length 2.6 to 3 mm.

Sexupara (ranunculi). Head and thorax deep shiny greenish-brown to brown or almost jet black on the thoracic lobes. Antennæ dusky black. Legs dark brown. Abdomen green, with 4 lines of darker spots and patches. Wax glands present. Often much white wool on body. Antennæ of 6 segments; i. shorter and broader than ii.; iii. longest, as long as iv.+v., with 18-24 narrow sensoria; iv. shorter than v., with 5-8 irregular narrow sensoria; v. as long as vi., with 0-3 small elongate sensoria and a sub-apical primary one; vi. with short, blunt "nail," and a few hairs at apex and a large primary sensorium at base. Rostrum reaches to second coxæ. Legs long and thin and projecting well beyond body.

Length 1.9 to 2 mm.

LOCALITIES. Ellerbeck, Crook, Westmorland, 15 vii.; Windermere, 14 viii. 12 and 12 ix. 14 (Rymer Roberts); Bowden, Cheshire, 7 v. 15; Great Salkeld, 16 ix. 12 (Britten); Wye, 7 vii. 13; Bilting, near Wye, 9 vii. 11 and vii. 17 and vii. 23; Box Hill,

Surrey, 14 ii. 11; Manchester; Ulcombe, near Maidstone and Cambridge (F.V.T.); Oxford, Dorking, Cove, Kincardineshire (B.M. Coll.); Malling (Massee); Scotland, vii. 26 (MacDougall); Belgium (Schouteden) and Germany (Koch, Kaltenbach, etc.); Russia (Mordwilko); Holland (Van der Goot); Prussia (In. B.M. Coll.).

FOOD PLANTS. *Populus* spp.; *Ranunculus* spp.; *Sonchus oleraceus*; *Chenopodium* roots. The chief poplars are *P. nigra* and *P. pyramidalis*; the chief *Ranunculus* is *R. repens*.

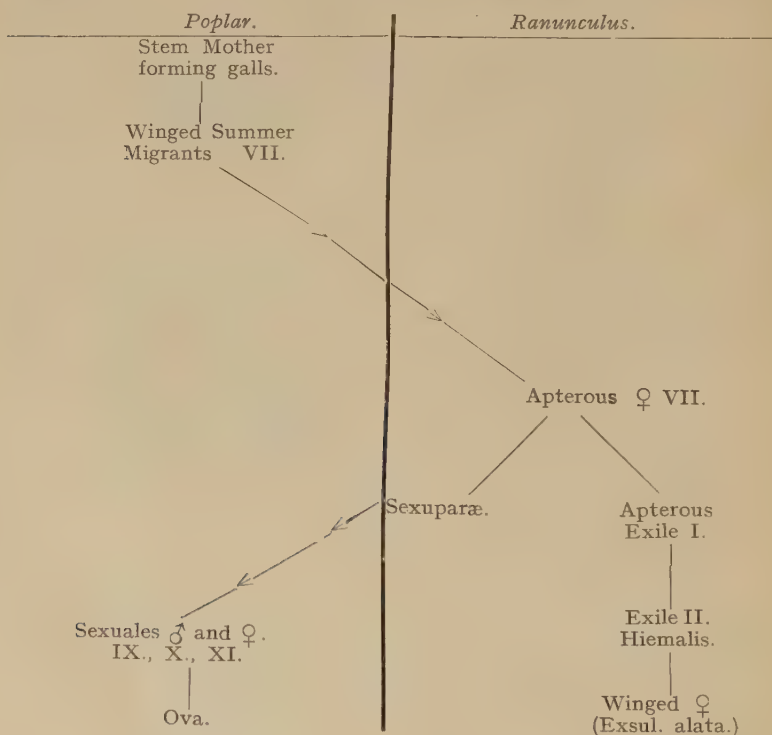
Observations. This aphid migrates between various kinds of *Populus*, upon which it is known, as *Pemphigus* (*Thecabius*) *affinis* and *Ranunculus*, upon which it has been called *Pemphigus*



Fig. 125.
Leaf Galls of *Thecabius affinis* Kaltenbach.

ranunculi (Kaltenbach). Mordwilko was the first to demonstrate that the two were the same species. Very marked leaf galls are formed on Poplars by the stem mothers, which hatch from ova laid on the trees. In the bent over leaf-gall the second brood is produced and they develop wings and fly away in July, August

and even during September in the North of Great Britain. Many settle on *Ranunculus*. On these plants, mainly below the ground, two generations are produced, the second being alate sexuparæ. Whilst on the *Ranunculus* they mainly occur on the roots; but some may be found under the leaves near the ground and are easily noticeable from the white wool they secrete. These sexuparæ become alate in October and as late as November, and fly back to the Poplars, where they produce the sexuales. At the same time we find overwintering nymphæ on the *Ranunculus* roots and I have observed alata coming from the *Ranunculus* even in June at the same time that the galls are found on the Poplars. These alata from the *Ranunculus* I have found on the wing and also settled on other *Ranunculus*. Whether these winged insects can reproduce on *Ranunculus* is at present not known. Rymer Roberts summarises the life cycle as follows :



The leaf galls on Poplars are very variable in colour and are turned over from the edge, the two folds being tight together ; they are pallid green to pale yellow and some show a rosy tint, others become bright red. Ants tend this species when in the ground and the apteræ have even been found in their nests.

Genus PROCIPHILUS Koch.

Stagona Koch.

Holzneria Lichtenstein.

Pemphigus Löw (part).

Brysocrypta Schouteden (part).

Nishiyama Matsumura.

Koch, Die Pflanz, 279, 284 (1857) ; Lichtenstein, Bull. Soc. Ent. Fr. (5), LXXVI. (1875) ; Löw, Wein. Ent. Zeit. Jahrg., I., 18 (1882) ; Schouteden, Mém. Soc. Ent. Belg., XII., 197 (a.p.) (1906) ; Kessler, Ber. d. Verh. f. Nat. z. Kassel., XXXIX., 30 (1894) ; Horvath, Faun. regni hungariæ Hemipt. 62 (a.p.) (1897) ; Del Guercio, Nuov. relaz., Se. I., 2. 95 (a.p.) (1900) ; Mordwilko, Ann. d. Mus. Zool. Acad. Imp. d. Sc. d. Petrograd, XIII. (1908) ; Tullgren, Arkiv. f. Zoologi, 14, 175 (1909) ; Van der Goot, Holland. Blattläuse, 443 (1915) ; Matsumura, Synop. Pemphigidæ Japan, 90 (1917) ; Baker, Bull. 826, U.S.A. Dep. Agri., 76, pl. XIII., G-N (1920).

Large species living in pseudogalls made of leaves. Apterous females with antennæ of 5 segments in the stem mother. Alate females with antennæ of 6 segments ; the secondary sensoria narrow and transverse ; the primary are irregularly round. No cornicles. Wax glands large and often marked. Wings large, fore pair with simple media, posterior with media and cubitus. Sexuales small ; apterous ; arostrate.

Four species occur in Great Britain, but all seem to be very rare ; they are :

1. *Prociphilus bumeliæ* Schrank.
2. *Prociphilus nidificus* Löw.
3. *Prociphilus cratægi* Tullgren.
4. *Prociphilus xylostei* De Geer.

The last I am almost certain can be placed as a British species for in 1884 I remember finding what was undoubtedly this insect

on Honeysuckle at Kingston-on-Thames, but as I have no specimen I am not recording it definitely.

PROCIPHILUS BUMELIÆ Schrank.

Aphis bumeliæ Schrank.

Eriosoma bumeliæ Heyden.

Pemphigus bumeliæ Kaltenbach.

Prociphilus bumeliæ Koch.

Pemphigus poschingeri Holzner.

Holzneria poschingeri Lichtenstein.

Pemphigus poschingeri Boas, Nusslin.

Brysocrypta bumeliæ Schouteden.

Schrank, Fn. Boica, II., 102 (1801) ; Heyden, Mus. Senk., II., 295 (1837) ; Kaltenbach, Mono. Pflanz., 177 (1843) ; Koch, Die Pflanz., 280, figs. 252, 253 (1857) ; Holzner, Stett. Ent. Zeit., XXXV., 221, 222 (1874) ; Lichtenstein, Bull. Soc. Ent. Fr. (5), LXXXVI. (1875) ; Boas, Tidsft. f. Stovvaesen, II. (a.p. 107-112) (1890) ; Nusslin, Die Tannenwurzelläus. Allgem. Forst. u. Jagdzeitung, 402-408 (1899) ; Keller, Beobacht. u. d. Leben. d. Tannenwurzelläus. Schweig. z. f. Forst. Bern., 8, 9 (1899) ; Schouteden, Mém. Soc. Ent., Belg., XII., 198 (1906) ; Tullgren, Arkiv. f. Zool., 14, 76 (1909) ; Van der Goot, Holl. Blatt., 445 (1915) ; Baker, Jour. Agr. Res. V., 23, fig. 1, A-L, 1916, p. 1118 ; Tullgren, Modd. No. 280 f. Cent. f. forsok. p. jordbruk. avdeln., 44, 27 (1925), etc.

Apterous viviparous female (Fundatrix). Dull yellowish-brown ; with whitish meal ; head and pronotum blackish-brown with white mealy patches. Antennæ dusky-brown ; legs black. Head rather small ; pronotum wider than long. Body hairs short and fine. Rostrum reaches second coxæ. Antennæ of 5 segments ; i. shorter and broader than ii. and wider than long ; iii. very much the longest, cylindrical ; iv. shorter than v., with usual sub-apical sensorium ; v. somewhat thinner than vi. ; " nail " short and blunt, with usual basal sensorium ; hairs short, thin, scanty.

Length 4 to 5 mm.

Alate viviparous female (Fundatrigenia). Head and thorax dark brown to black, with white meal. Abdomen dull yellowish red to dirty yellowish-brown. Antennæ dark brown to brownish-black. Legs dark. Head slightly hairy. Antennæ of 6 segments

long and thin ; segment i. wider but no longer than ii. ; iii. much the longest, about as long as iv. + v., with 15 to 20 partial annulations ; iv. and v. about equal ; iv. with 3 to 5 partial annulations on apical half ; v. thinner than iv. ; vi. with short " nail," usual sensorium at its base. Rostrum short, not quite reaching second coxæ. Wings rather heavy with brownish veins and stigma.

Length 4 mm.

Alate female (Sexupara). Resembles the *Fundatrigenia* in many respects, but the antennæ differ, segments iii. to vi. with prominent narrow transverse sensoria, almost annular ; i. larger



Fig. 126.

Leaf nest of *Prociphilus bumeliæ* Schrank.

than ii. ; iii. with 23-27 sensoria, not quite so long as iv. + v. ; iv. about as long as v. with 11 to 15 sensoria ; iv., v. and vi. about equal in length ; v. with 11-14 sensoria and the usual primary one near apex ; vi. has 6-8 marked secondary ones and a

prominent oval primary one at base of the short "nail"; a few hairs on "nail." Wings normal. Wax plates prominent.

Length 4mm.

FOOD PLANTS. Ash (*Fraxinus excelsior*); *Abies balsamea* and *Pinus* (Holzner).

LOCALITIES. Wye, vii. 10; 3 vi. 12 and 17 vii. 26 (F.V.T.); Scotland (MacDougall); Sweden (Tullgren); Prussia (B.M. Coll.).

Observations. This seems to be a very rare insect in this country. In 1910 and 1912 I found the "leaf-nests" on Ashes near Wye, but in only one could I detect anything but exuviae. In 1926 I observed close to my house in July what appeared as small snowflakes drifting in the air about 3 o'clock in intense heat, I managed to catch one in my hat and found it to be this insect, covered with a dense mass of snow-white wool; most of them were high up. I searched the numerous Ash shaves and trees near at hand, but could find no trace of leaf nests; possibly they occurred high up on some large trees. The photograph was sent me by Dr. Stewart MacDougall. The insect differs in many respects from the next species (*nidificus*). The insects leave the Ash in July, and are apparently the same as the *Prociphilus poschingeri* of Holzner; which occurs on *Abies balsamea* and *Pinus*.

Van der Goot describes the fundatrix and the wingless oviparous female and wingless male.

There are three alate females in the British Museum bearing the label "Pemphigus fraxini Htg. England." These Laing regards as *P. bumeliæ* (Schr.). The *Prociphilus fraxini* L. quoted by Wilson and Vickery in their list is erroneous; Linné *fraxini* is, of course, the Psyllid, *Psyllopaïs fraxini*.

PROCIPHILUS NIDIFICUS Löw.

Pemphigus nidificus Löw.

Löw, Wien. Ent. Zeit. Jahrg., I., 13-19 (1882); Del Guercio, Prospetto. d. Afidofauna italica, Nuov. relaz., Se. I., 11, 100 (1900); Tullgren, Arkiv. f. Zool., V., 14, 81 (1909); Tullgren, Medd. 280, f. Central. f. försök. p. jordbrück. Ent. avdeln., No. 44, 27 (1925).

Alate viviparous female (Fundatrigenia). Head and thorax deep brown, lobes almost black. Abdomen reddish-brown to dull yellowish-brown, with darker lateral spots. Antennæ and

legs deep brown. Head rounded in front, with two flat processes. Antennæ not so long as head and thorax, of 6 segments; i. a little longer than ii.; iii. longest, with 18-24 narrow sensoria; iv. a little longer than v., with 5-10 narrow sensoria; v. longer than vi., with an irregular shaped sensorium near apex. (Tullgren says the fifth segment has 0-4 sensoria; my specimens show none at all); vi. with a short blunt "nail" and a clear round sensorium, and

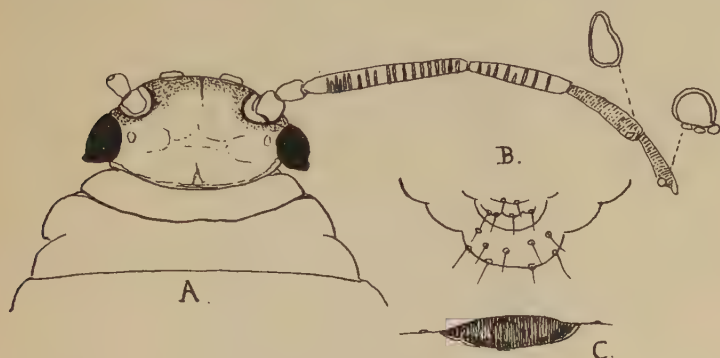


Fig. 127.—*Prociphilus nidificus* Löw.

A. Head and antenna of alate ♀; B. Cauda and anal plate; C. Lateral gland.

3-4 small secondary ones at its base; v. and vi. with fine spinose imbrication. Legs moderately long and thick, a few hairs on tibiæ and tarsi. Cauda and anal plate both rounded, with a few prominent hairs. Abdomen, with marked glands on each side. Wings large and with similar venation to *bumeliæ*; stigma and veins yellowish-brown and the membrane also slightly tinged.

Length 5 to 5.5 mm.

FOOD PLANT. Ash (*Fraxinus excelsior*).

LOCALITIES. Scotland (MacDougall), vi. 13; Germany (Löw).

Observations. I have only seen this insect once, specimens of the alatae being sent me by Dr. Stewart MacDougall and the photograph of the leaf nest which is reproduced here. This leaf nest resembles to some extent that of *P. bumeliæ*, but is more densely closed. The alatae differ very much; the antennæ are much shorter and wider, being only 1.5 to 1.8 mm. long, the body

being 5 mm. ; in *bumeliæ* the antennæ are 2 to 2.2 mm. long and the body only 4 mm. to 4.8 mm. long. The relative lengths of the segments also differ and to some extent the sensoria ; in *nidificus* the third antennal segment has 18 to 24 transverse sensoria, in *bumeliæ* 15 to 20 ; and iv. in *bumeliæ* with 3 to 5, whilst in *nidificus* they vary from 5 to 10 in the fundatrigenia. Unfortunately my specimens do not show the lower wings, but the upper nearly agree with those of *bumeliæ*.

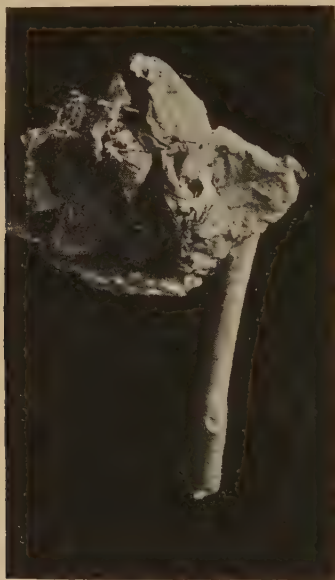


Fig. 128.

Dried Leaf nest of *Prociphilus nidificus* Löw.

PROCIPHILUS CRATÆGI Tullgren.

Tullgren, Arkiv. f. Zoologi, 14, 96, figs. 44 and 48 (1909); Van der Goot, Holland Blattläuse, 450 (1915); Theobald, Entomologist, L., 76 (1917); Essig and Kuwana Aphididæ of Japan, 104-105, fig. 35 (1918).

Apterous viviparous female (Fundatrix). Green to brownish-green, covered with fine meal. Head and pronotum deep brown to almost black and large. Cauda dusky. Antennæ and legs

dark brown. Body large, oval and globular. Cauda and anal platerounded, the former with a few short hairs, slightly prominent. Spiracles showing as small dark lateral spots. Head broad and with pronotum showing marked dark chitinated areas (vide figure). Antennæ of 5 segments, moderately long and narrow, reaching nearly to second coxæ; segment i. shorter and broader than ii.; ii. with two hairs near apex; i. with one hair; iii. long, about as long as v., with one or two hairs at the side and one small one at apex; iv. about half of v., with a clear round primary sensorium and a long hair on each side; v. with short, blunt nail, with a few short apical hairs, a round clear primary sensorium at base of nail and several very small secondary ones on one side; a large lateral hair below and one median below and a small one about mid-way on opposite side. Rostrum dark, reaching to second coxæ, apical segment longer and narrower than penultimate. Legs moderately long and thick, with a few scattered hairs. Anal plate and cauda rounded, with many short, pale hairs on head.

Length 2.5 to 3 mm.



Fig. 129.—*Prociphilus crataegi* Tullgren.

A. Head and antenna of apterous ♀; B. Wings; C. Antenna of alate ♀ (after Tullgren).

Alate viviparous female (Fundatrigenia). Head and thorax dark brown to black. Abdomen green to dull greenish yellow or greyish-green. Antennæ and leg dark, former brown, latter greenish-brown. Cauda and anal plate dusky. Antennæ not quite so long as head and thorax, of 6 segments; i. a little wider and

shorter than ii. ; iii. longest, about as long as iv. + v., with 19-24 narrow transverse pale sensoria ; iv. about as long as v., with 8-12 transverse sensoria ; v. with 3 to 10 and a large irregular shaped primary one ; vi. a little longer and narrower than v., no secondary sensoria ; nail short and rather narrow, a large irregular basal sensorium ; a few very short apical hairs. Cauda and anal plate rounded, with a few short hairs. Legs with short pale hairs on the tibiæ and tarsi. Rostrum rather narrow, nearly reaching second coxæ. Stigma and costa greenish-brown ; veins pallid.

Length 2 to 2.5 mm.

FOOD PLANT. *Cratægus oxyacantha* ; *Cratægus cuneatus* in Japan.

LOCALITIES. Camberley, 23 vi. 16 (E. E. Green) ; Sweden (Tullgren) ; Oxshott, alatae beaten off pines ; Pylle, Somerset (B.M. Coll.).

Observations. Apparently a rare species. I have only seen it once, numbers being sent me by Mr. E. E. Green. It forms dense white tufts on the Hawthorn, living both in contorted leaves and on the stalks. Only a few virgogenia occurred, but the fundatrigenia swarmed from the pseudogalls in June. In one case the nymphæ covered the berries with white wool. Tullgren described the sexupara and sexuales. He refers to two forms of sexupara as *f. maxima* and *f. minima*. The 6 segmented antennæ of former have 22 to 25 sensoria on segment iii ; 12 to 15 on iv. and 11 to 13 on v. In *minima* the third has 16 to 18 ; iv. has 9 to 10 ; v. has 7 to 8. The length of *maxima* is 1.7, of *minima* 1.1 mm. Sexual ♀ is 0.95 and the ♂ 0.65 mm. long.

Tribe PEMPHIGINI.

A specialised tribe which at some time produce true or pseudo-galls, during their life-cycle, at others they are found in the soil. Distinct cornicles are present, but they are small. Antennæ of the alatae with narrow transverse or linear sensoria, sometimes oval ; now and then no sensoria occur. Wax glands present, but are not very highly specialised. The antennæ composed of 6 segments in the alatae and in nearly all genera are provided with linear, oval or irregular shaped sensoria. The sexuales are small, apterous and arostrate. The oviparous females lay but a single ovum.

Baker tabulated the known genera as follows :

1. Unguis of segment vi. of alate female distinctly long and *Aphis*-like. *Mordwilkoja*.
 Unguis short and knob-like. 2.
2. Media once branched. 3.
 Media simple. 4.
3. Antennæ of alatæ usually without secondary sensoria. Wings flat in repose. *Phloeomyzus*.
 Antennæ of alatæ with secondary sensoria. Wings not flat in repose. *Pachypappella*.
4. Both media and cubitus present in hind wings. 5.
 One oblique vein in hind wing. *Dryopeia*.
5. Antennæ of alatæ without secondary sensoria. Wings flat in repose. *Rhizoctonus*.
 Antennæ of alatæ with secondary sensoria. Wings not flat in repose. 6.
6. Antennæ of alatæ rather short and thick. Stem mother with the antennæ of 4 segments. *Pemphigus*.
 Antennæ of alatæ rather long and thin. Stem mother with antennæ of 5 segments. *Cornaphis*.

Of these genera *Pemphigus*, *Phloeomyzus* and *Pachypappella* are so far known to occur in Britain. I have left *Phloeomyzus* provisionally here, but I think it should be placed in a separate tribe or sub-tribe, owing to the absence of secondary sensoria on the third antennal segment of the alate female and the male.

Dryopeia Kirkaldy is *Tetraneura*.

Genus PACHYPAPPELLA Baker.

Pachypappa Tullgren (non Koch).

Baker, Bull. 826, pl. XI., H.M. (U.S. Dept. Agri.) (1920) ; Del Guercio, Redia, III., fas. 2, 306-314 (1904-05) ; Tullgren, Arkiv. f. Zoologi., 14, 69 (1909).

Antennæ of alatæ of 6 segments, with elongate-oval transverse sensoria. Apteræ with antennæ of 4 to 5 segments. Cornicles in apteræ as pores, more pronounced in alatæ. Stem mother with wax plates. Venation marked ; fore wings with media once branched, hind pair with media and cubitus. They live in leaf nests and in the soil.

Koch created the genus *Pachypappa* in 1854, the types being *marsupialis* and *vesicalis*. The first is certainly a true *Pemphigus* and thus the genus has to sink. Tullgren in 1909 used his *lactea* as the type owing to *marsupialis* being a *Pemphigus*, but the latter had been made the type of the genus *Pachypappa*. Koch's *Pachypappa* thus has to become a synonym of *Pemphigus* and consequently Baker has correctly renamed Tullgren's *Pachypappa*, *Pachypappella*.

Del Guercio, etc., have treated Koch's genus as valid. To some extent this genus is related to *Eriosoma* and *Anæcia*, but does not come very near them for the antennal sensoria differ from the former and the wing venation from the latter.

The genus undoubtedly comes in the *Pemphigini*.

Two species occur in Great Britain :

1. *Pachypappella reaumuri* Kaltenbach.

2. *Pachypappella piceæ* Hartig.

The latter is placed here with some hesitation, but it approaches *lactea* so closely that I have included it with *reaumuri*.

PACHYPAPPELLA REAUMURI Kaltenbach.

Schizoneura reaumuri Kaltenbach.

Pachypappa reaumuri Del Guercio.

Reaumur, Ins., III., pl. 23, fig. 1-3 (1737) ; Kaltenbach, Mono. Pflanz., 175 (1843) ; Ratzeburg, Die Forst. Insecten., III., 221, 30,

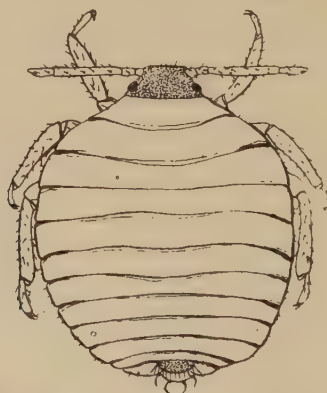


Fig 130.—*Pachypappella reaumuri* Kalt. (apterous viviparous female).

(1844) ; Kieffer, Ann. Soc. Ent. Fr., 70, 532 (1901) ; Schouteden, Ann. Soc. Ent. Belg., 47, 188 (1903) ; Del Guercio, Redia, II., fas. 2, 306-315 (1904) ; Trotter, Marcellia, Avellino, VI., 31, n. 26 (1907) ; Theobald, Entomologist, April and May, 1915 + 5 figs. and pls. IV. and V.

Apterous viviparous female (Fundatrix). Globular, very convex above, flattened below. Deep greenish to deep brown or olive brown, some deep olive green, one orange yellow. Head, antennæ, legs and cauda black. Antennæ (Fig. 131C.) not quite so long as head and thorax ; segment i. small ; ii. a little longer than i. ; iii. the longest, from $2\frac{1}{2}$ to 3 times as long as iv. Eyes moderate size, dark. Rostrum thin and acuminate, pale at base, dark on apical half, reaching just past base of second coxæ. Legs dark, thick, rather short, with short scattered hairs ; the legs project a little beyond the sides of the body. Body segments deeply constricted, especially dorsally, with fine scanty short hairs, and to some extent farinaceous, especially between the segments.

Length 3.8 to 5 mm.

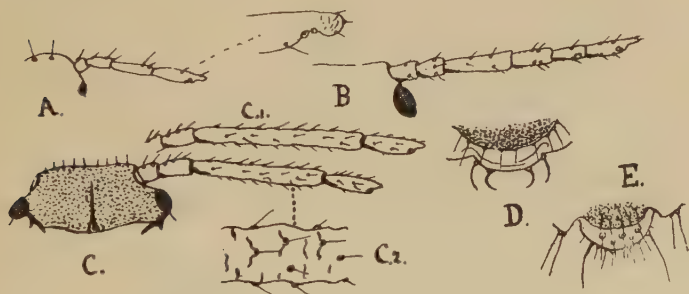


Fig. 131.—*Pachypappella reaumuri* Kalt.

A. Head of larva from alate female ; B. Head of nymph ; C. Head of apterous viviparous female ; C1. Antennal variation ; D. Cauda of viviparous female ; E. Cauda of nymph.

Progeny of Fundatrix. As I only found one or two and these became nymphæ I append Del Guercio's description : " Yellowish-brown, with four-jointed antennæ, rather longer than the whole body. Eyes red. Rostrum and feet well developed. Siphons quite distinct and black. The antennæ have the ' nail ' the length of the fourth segment, and as the insect grows a fifth segment appears." This stage, only figured by Del Guercio in its first

instar, is very marked, and very unlike the larva from the alate female.

Nymph. (Fig. 131, B. and E.) Yellowish to yellowish-green and yellowish-brown. Legs, wing-pads and sometimes head dark. Antennæ with segments i. and ii. small, about equal in length; iii. longest, about equal to iv. + v., which are about same length; vi. a little longer than v., "nail" short and blunt, a few hairs on all segments; sensoria normal. Rostrum yellow, apex dusky, reaching to third coxæ. Apex of body with some long stiff hairs, cauda dark, hairy. Anal plate pale, hairy. A few long hairs along sides of abdomen.

Length 2 to 2.8 mm.

Alate viviparous female. Head, thorax, antennæ and legs black. Abdomen yellow-green to dark green. Cauda dusky to black. Antennæ not quite so long as head and thorax (Fig. 132A); segments i. and ii. small; ii. somewhat globular towards apex; iii. longest, with 8 to 10 sensoria spreading across the segment; iv. rather more than half of iii. and about equal to v. or slightly

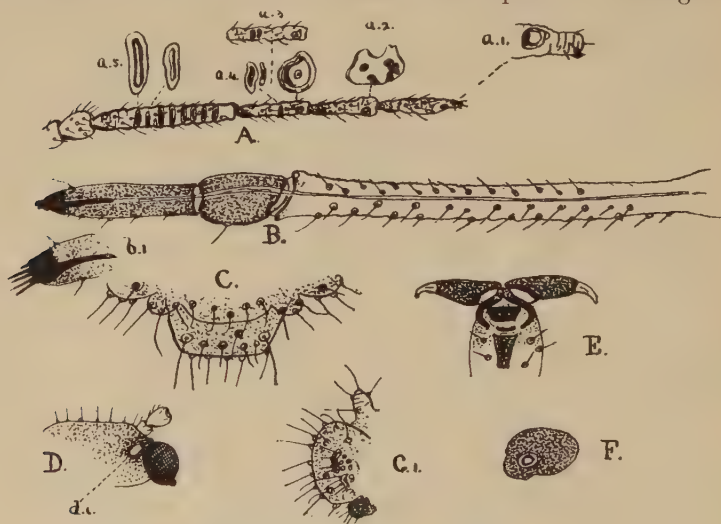


Fig. 132.—*Pachypappella veaumuri* Kaltenbach.

Alate ♀. A. Antenna; a1. further enlarged "nail"; a2, a4, a5. further enlarged sensoria; a3. another form of segment III; C. Apex of body; C1. side view of C.; D. head; d1. stemmata; E. unguis; F. dark area at side of body.

shorter, with one or two slit-like sensoria and one rounded one near apex ; v. with a large irregular primary sensorium near apex and according to Del Guercio a narrow one near middle ; vi. about as long as v., with a short, blunt " nail." Eyes large, red to black. Rostrum reaches past base of second coxæ, almost to third, narrow, apex dark. Cauda and anal plate dark. Legs rather long and thin ; tibiæ and tarsi with fine hairs. The abdomen (when in balsam) shows two lateral rows of dark spots, each with a small pale eccentric spot (F.). Lateral borders of

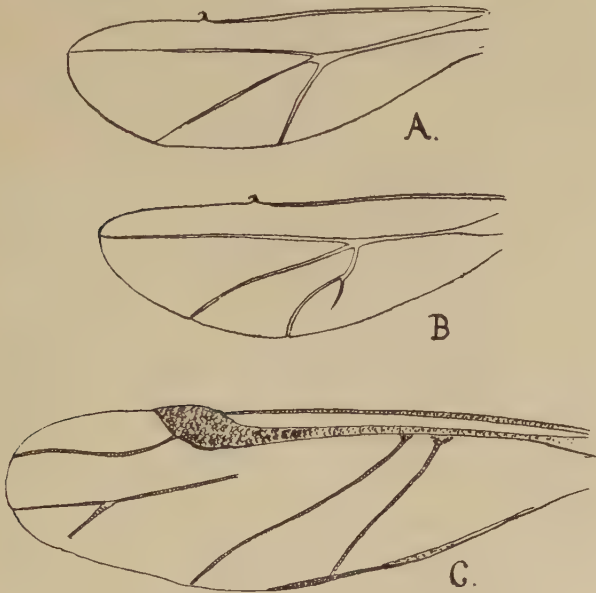


Fig. 133.—Wings of *Pachypappella reaumuri* Kalt.
A. Hind wing ; B. Abnormal form ; C. Fore wing.

abdomen with a few fine hairs. Wings smoky, with dark brown to black veins and stigma ; media reaching to edge of wing ; cubitus often not reaching edge of wing ; in the hind wings (Fig. 133A) the radius, radial sector and second anal arise close together and reach edge of wing normally as simple veins, but now and then the second anal is forked, the inner branch not reaching the wing border (B.). This abnormality may often be seen in one wing and not in the opposite one.

Larva of alate female. (Fig. 134.) Yellow to pale citron yellow. Antennæ (Fig. 131, A.) of 4 segments, about half of body ; i. small ; ii. longer than i. but shorter than iii. ; iv. a little longer than iii. and slightly swollen, with a short blunt "nail." Eyes very small, composed of two dark red to black facets and at the sides two clear round areas (Fig. 134A). Head rather long and narrow. Rostrum pale, apex slightly dusky, projecting far

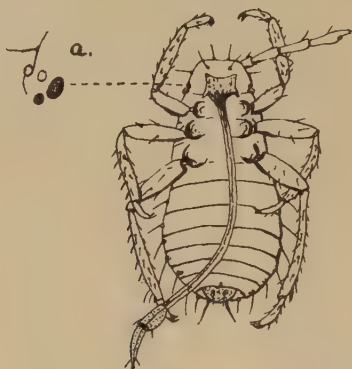


Fig. 134.—Larva from alate female (*P. reaumuri* Kalt.).

beyond end of body. Abdomen slightly swelling out apically and with a few long apical and lateral pale hairs. Legs pale, moderately long and thick. Anal plate dusky.

Length on entering soil .5 to .7 mm.

FOOD PLANTS. *Tilia grandifolia* ; *T. parvifolia* ; *T. argentea* ; *T. europea* ; *T. platyphyllæa*.

LOCALITIES. Bearsted, Kent, vi. 1914-1925 ; Italy (Del Guercio).

Observations. This marked leaf gall was noticed by Reaumur on Lime (*Tilia*) and figured by him (Ins., III., pl. 23, figs. 1-3) and the insect causing it was described by Kaltenbach. Neither Walker nor Buckton refer to it as occurring in Great Britain. Lichtenstein (Les Pucerons Mono. des Aphidiens, p. 30, no. 18) appeared inclined to consider that Koch's *Pachypappa vesicalis* was the same as Kaltenbach's *S. reaumuri*. Del Guercio first pointed out that they are distinct, *vesicalis* being a Poplar Aphid, *reaumuri* living on *Tilia*. They belong to different genera. The



Fig. 135.
Leaf-galls of *Pachypappella reaumuri* Kalt. Two forms.

insects I found at Bearsted swarmed on one or two large lime trees there and caused a very unsightly appearance. Vast numbers of ants were attracted to them. The leaf galls vary in form. The usual type had one large leaf rolled up in cigar fashion, with the top of the shoot and the smaller terminal leaves crumpled up



Fig. 136.
Inside of leaf-gall of *P. reaumuri* Kalt.

inside, the stalk markedly bent over just before the final leaf gall arises. The second type has the large outer leaf bent over from above downwards and backwards, forming an irregular triangular mass, with the sides of the leaf often folded laterally over the median portion. The longest gall masses I found were 4 inches. The leaves both internal and external were remarkably crisp and broke at the least touch. Alatae commenced to hatch out on the 15th of June and continued to do so until the 20th. Some of the young I found later attached to the roots of grass and primroses growing in the breeding cages. According to Del Guercio this insect leaves the Lime trees in Florence also in June and returns in September. At Bearsted this aphid was very largely attended by ants (*Lasius fuliginosus*), which formed a long black column coming from and going up the trees. The former were frequently noticed carrying the Plant Lice off with them, apparently to their nests near by.

PACHYPAPPELLA PICEAE Hartig.

Rhizomaria piceae Hartig.

Pemphigus piceae Tullgren.

Hartig, Verh. d. Hils.-Solling. Forst. Jahrg., 52-57, for 1856 (1857); Jacobi, Tharander, Forst. Jahrbh., 55, 3, 177-197, pl. II. (1905); Tullgren, Arkiv. f. Zool., V., 14, 138-142, figs. 65-67 (1909).

Alate viviparous female (sexupara). Head of thorax dull dusky brown to dark brown. Abdomen bright yellowish to greenish.

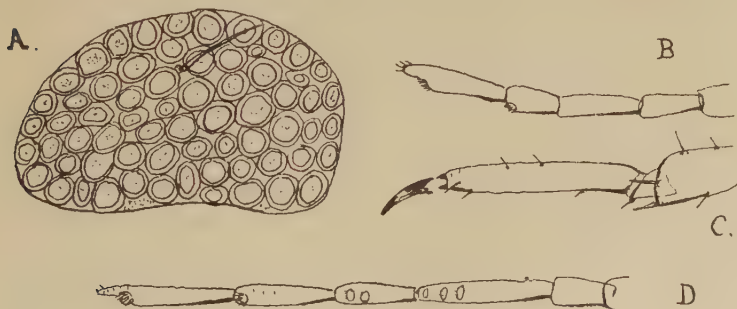


Fig. 137.—*Pachypappella piceae* Hartig.

A. Wax gland of virgogenia; B. Antenna; C. Tarsus of hind leg; D. Antenna of sexupara (after Tullgren).

Legs and antennæ dusky. Antennæ of 6 segments; i. wider but shorter than ii., which is longer than normal in this genus; iii. as long as to a little longer than vi., with 3-4 oval sensoria; iv. a little longer than half of iii., but shorter than v., with 1-2 similar sensoria; v. not so long as basal portion of vi.; vi. with exceptionally long basal area; "nail" very small; sensoria normal. Wax glands absent. Cornicles as faint rings in some specimens, in others they seem to be wanting. Legs rather long and narrow. Tarsi of 2 segments. Rostrum to third coxæ.

Length 1.9 to 2 mm.

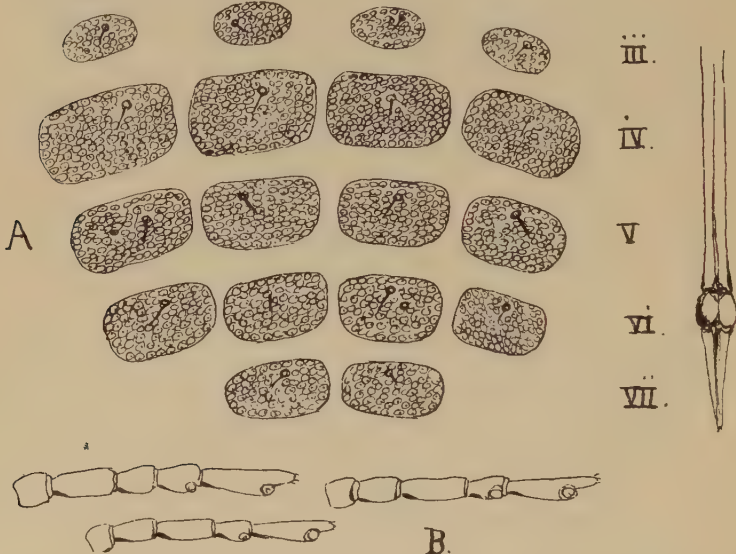


Fig. 138.—*Pachypappella piceæ* Hartig.

A. Wax plates of apterous ♀; B. Antennæ of apterous ♀ and Rostrum.

Apterous viviparous female (virgogenia). Pure white to dull creamy white, with brown head, antennæ and legs often showing a dull purplish hue when alive. Antennæ shorter than head and thorax, of 5 segments; i. shorter and broader than ii.; iii. about as long as v.; iv. about as long as ii.; v. with a short blunt "nail," with a small sensorium at its base and one at apex of iv. Wax glands prominent. Rostrum to third coxæ. Cornicles as mere pores, sometimes apparently wanting.

Length 1.9 mm.

FOOD PLANTS. *Pinus spp.*; *Larix sp.*; *Picea* roots; *Picea sitchensis* and *P. orientalis*.

LOCALITIES. Oxshott Common, Surrey, 7 vi. 84; Wye, on *Larix* roots, 17 iii. and 28 iv. 15 (F.V.T.); Windermere on *Picea* roots, 17 iii. 15 (R. Roberts); Scotland (MacDougall); Ross-shire (Jackson); Co. Down, Ireland, 7 ii. 16 on *Picea excelsa* roots (Dr. Henry); Co. Tyrone, Ireland, 1920 and i. 1922 on Sitka Spruce (Cunliffe); Stockholm, Ostengötland, Adelsnäs (Tullgren).

Observations. This Aphid appears at times to be very common on the roots of Conifers in nurseries. In the apterous stage it produces much white flocculent wool in the soil, the writer having seen the soil in digging up nursery stock, quite white with the excretions. It also appears to stunt materially the growth of seedlings and young plants up to five years old. I have only seen one alate female and have failed to hatch them out from great numbers dug up in the nurseries; the mechanical change of the process seems to completely upset the normal development.

I place it in this genus provisionally only as I have not had enough alate females to examine.

Genus PEMPHIGUS Hartig.

Brysocrypta Haliday.

Aphioides Rondani.

Amycla Koch.

Pachypappa Koch, etc.

Pemphilus Kalt.

Kessleria Lichtenstein.

Hamadryaphis Kirkaldy.

Hartig., Jahresb. v. d. Forts. d. Forst. Naturk., I., 645 (1837), 359 (1841); Haliday, Ann. Nat. Hist., II., 190 (1839); Westwood, Int. Mod. Class Ins. Synop., II., 118 (1840); Rondani, Nuovi. Annali. Sci. Nat. Bologna, VIII., 439 (1847); Koch, Die Pflanzenläuse, 290 (1857); 269 (*Pachypappa*) (1857); Hartig, Verh. d. Hills-Solling-Forstvereins, Jahrg., 1856, 52 (1857); Lichtenstein, Mono. Pucerons d. Peupl., 16 (1885); Kirkaldy, Entomologist, XXXVII., 279 (1904); Tullgren, Arkiv. f. Zoologi,

V., 14, 112 (1909) ; Baker, Bull. 826, U.S. Dep. Agri., 71, pl. XI., N. to V. (1920).

Characters of genus. Antennæ of alate female of 6 segments, with narrow, somewhat irregular sensoria, annular in form ; of apteræ of 4 to 5 segments ; stem mother with 4. Cornicles present, but weakly developed in most. Wax glands prominent in the apteræ. Fore wings with simple media (rarely I have found it furcate, in some cases on one wing only) ; hind wings with media and cubitus. The sexuales are minute, arostrate and apterous. The females lay one egg. They produce very marked galls on Poplars and part of their life is spent on low-growing herbs and in the soil.

The genus *Pemphigus* was erected by Hartig in 1837. In 1860 Passerini set *bursarius* as the type. In 1840 Westwood used Haliday's name *Brysocrypta* (1839) and placed *bursaria* also as the type. Consequently *Brysocrypta* falls under *Pemphigus*. Baker places Hartig's *Rhizomaria* as a synonym, *piceæ* Hartig being the type. *Piceæ* is certainly not a true *Pemphigus* and I have placed it in *Pachypappella*. Koch's *Amycla* (*fuscicornis* type) is evidently partly this genus. Rondani made *bursaria* the type of his *Aphioides*, so this also falls as a synonym. Koch's *Pachypappa* with *marsupialis* as type also certainly sinks, for that species is closely related to *bursaria*. Tullgren's *Pachypappa* with *lactea* as type is quite different and is now treated under *Pachypappella* Baker. *Spirothecæ* being a typical *Pemphigus*, Lichtenstein's *Kessleria* and Kirkaldy's new name *Hamadryaphis* (1904) of course are both reduced to synonyms.

Linnæus' *Aphis bursaria*, a very marked species, is fixed definitely as the type of *Pemphigus* Hartig.

SPECIES OF *Pemphigus* IN GREAT BRITAIN.

Pemphigus bursarius Linnæus.

- „ *filaginis* Fonscolombe.
- „ *spirothecæ* Passerini.
- „ *borealis* Tullgren.
- „ *auriculæ* Murray.
- „ *pseudoauriculæ* sp. nov.
- „ *rubiradicis* sp. nov.
- „ *glebæ* Jackson.

LIST OF FOOD PLANTS.

<i>Auricula</i> sp.	<i>P. auriculæ</i> Murray.
" "	<i>P. pseudoauriculæ</i> sp. nov.
<i>Daucus carota</i>	<i>P. bursarius</i> Linnæus.
<i>Gramineæ</i>	<i>P. auriculæ</i> Murray.
<i>Gnaphalium uliginosum</i>	<i>P. filaginis</i> Fons.
<i>Lactuca</i>	<i>P. bursarius</i> Linn.
"	<i>P. borealis</i> Tull.
<i>Lapsana</i>	<i>P. bursarius</i> Linn.
<i>Picea</i> spp.	<i>P. auriculæ</i> Murray.
<i>Populus</i> spp.	<i>P. bursarius</i> Linn.
" "	<i>P. filaginis</i> Fons.
" "	<i>P. spirothecæ</i> Pass.
" "	<i>P. borealis</i> Tull.
<i>Rubus idæus</i>	<i>P. rubiradicis</i> sp. nov.
<i>Sonchus oleraceus</i>	<i>P. bursarius</i> Linn.

PEMPHIGUS BURSARIUS Linnæus.

- Aphis bursarius* Linnæus.
Pemphigus lactucarius Passerini, etc.
Pemphigus bursarius Kaltenbach, Koch.
Amycla fuscicornis Koch.
Brysocrypta lactucarius Schouteden.
Glyphina betulæ Buckton.*
Eriosoma bursaria Ruricola.
Pemphigus pyriformis Lichtenstein, etc.
Brysocrypta pyriformis Schouteden.
Eriosoma populi Mosley.

Linnæus, Syst. Nat. Ed., 10, 453 (1758) ; Fabricius, Syst. Ent., 735 (1775) ; Schrank, Fn. Boica, II., 113 (1801) ; Kaltenbach, Mono. Pflanz., 182 (1843) ; Passerini, T. Giardini, III., 262 (1856) ; Koch, Die Pflanz., 292, figs. 362, 363 (1857) ; and 303, figs. 371, 372 (*Amycla*) ; Passerini, Aphid. Ital., 75 and 77 (*lactucarius*) (1863) ; Courchet, Mém. d. l. Acad. d. Montpellier, 49, 93, pl. V., Fig. 4 and 4a, and pl. VI., Figs. 3, 6 (a.-p.) (1879) ; Buckton, Mono. Brit. Aphid., III., 117, pl. CXI., figs. 1-7 ; pl. CXIII.,

* An examination of Buckton's slide of *Glyphina betulæ* convinces me that the single alate ♀, the apteræ and the nymphæ are all *P. bursarius*. Buckton has no data on his slide and he gives no details in his description as to where he found the specimens or the hostplant. (Laing.)

figs. 6-8 (a.-p.) (1881) ; Kessler, Ber. v. Ver. f. Naturk, z. Kassel, XXVIII., 37, pl. I., figs. 1-9 (1882) ; Lichtenstein, Mono. d: Pucerons d. peuplier, 29, pl. I., figs. 1-5 (1886) ; Del Guercio, Prosp. d. afidofauna italica, Nuove. relaz., Se. I., 2, 98 (1900) ; Schouteden, Ann. Soc. Ent. Belg., XLVII., 182 (1903) ; idem., 183 (*pyriformis*) ; Schouteden, Mém. d. l. Soc. Ent. Belg., XII., 200 (*pyriformis*) and 199 (*lactucarius*), 1906 ; Mordwilko, Biol. Zentralbl., XXVII., 774 (1907) ; Tullgren, Arkiv. f. Zoologi., V., 14, 114-128, figs. 54-59 (1909) ; Tullgren, Medd. No. 280, f. central. f. försök. p. jordbruk. Entomo. avdel., 44, 30 (1925).



Fig. 139.—*Pemphigus bursarius* Linnæus.

A. Antenna of apterous ♀ (fundatrix) ; B. of alate ♀ from Poplar gall.

Apterous viviparous female (Fundatrix). Dull green, pale green to deep greyish-green. Head, legs and antennæ dusky, in some with a dull purplish hue. The whole body covered with meal. Antennæ short, of 4 segments ; i. wider, but scarcely longer than ii. ; iii. a little longer to about same length as i. and ii., a little longer than iv., with minute spinose transverse imbrications ; iv. also imbricated, " nail " short and blunt, with a few spine-like apical hairs, a fringed sensorium at base and one at apex of iii. Abdomen markedly segmented ; wax plates prominent, six rows of six in a row and two on seventh segment. Rostrum rather thick, reaches second coxae. Cornicles mere rings, but in some specimens slightly raised. Legs short and rather stumpy.

Length 2-2.2 mm.

Alate viviparous female (Fundatrigenia). Head and thorax blackish-brown ; thoracic lobes very dark. Abdomen greyish-green to pale green, sometimes with darker markings and dark lateral spots, covered with white meal and flocculent matter. Cauda dusky. Antennæ short, about as long as head and thorax, of 6 segments, i. wider but no longer than ii. ; iii. longest, about as long as iv. + v., with 8-14 annular sensoria, not quite encircling



Fig. 140.—*Pemphigus bursarius* Linnæus.

A. Antenna of fundatrigenia from ants nest ; B. of virgogenia ; C. of sexupara (=lactucarius) ; D. of virgogenia (=lactucarius).

the segment and often somewhat irregular ; iv. small, about as long as i. + ii., shorter than v., with 2-6 partial annular sensoria ; v. with 2-5 sensoria, irregular ; vi. with short blunt " nail," and 4-5 partial sensoria + a fringed primary one at base of " nail " ; apex with a few spines. Rostrum to second coxæ. Wing venation normal. Legs somewhat long ; second tarsal long ; first small ; with short hairs.

Length 1.7 to 2.2 mm.

Apterous viviparous female (virgogenia) (=lactucarius). Pallid yellowish-white to pale yellow, mealy. Head, antennæ and legs dusky. Abdomen with small, dark lateral spots. Antennæ short, of 5-6 segments ; pale brown, apices dark. In the 5 segmented forms, iii. is longer than iv., but a little shorter than v. ; iv. small, about as long as ii. ; " nail " short ; sensoria normal ; those of 6 segments have iii. a little longer than ii. or iv., but shorter than vi., usually about half its length ; iv. and v. nearly equal ; " nail " short and blunt ; sensoria normal. The specimens with

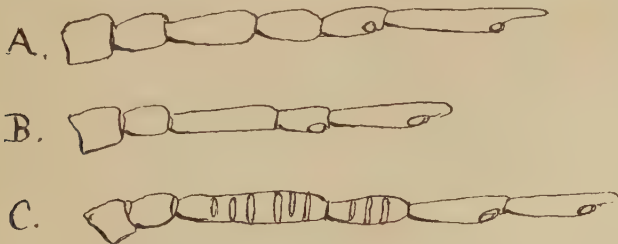


Fig. 141.—*Pemphigus bursarius* Linnæus.

A. and B. Antennæ of virgogenia ; C. of sexupara.

antennæ of 6 segments seem to be hibernators. The rostrum reaches nearly to or just beyond second coxæ. Cornicles mere rings or very slightly prominent. Legs somewhat long and rather thick. Basal segment of tarsi small, with 2 spines; hairs at apex of second and a few on the legs. Wax glands as in fundatrix.

Length 1.8 to 1.9 mm.

Alate viviparous female (Sexupara) (= *lactucarius*). Head dark brown. Thorax blackish-brown, lobes darkened and shiny. Abdomen pale yellowish-green, pale green to dull greyish-green,



Fig. 142.—*Pemphigus bursarius* Linnæus.
From lettuce roots (*lactucarius*).

darker central mottling. Antennæ rather short, of 6 segments; i. a little broader and shorter than ii.; iii. longer than vi., with 6 irregular annular sensoria on lower surface, scarcely showing above; iv. about half iii., about as long as v., 2-3 annular sensoria below, not showing above; vi. longer than v., "nail" short and blunt; v. and vi. with no secondary sensoria. Rostrum reaches about second coxæ. Wings normal. Cornicles slightly elevated. Legs rather long and narrow.

Length 1.6 to 2.2 mm.

Nymph. Pallid; wing cases dusky. Eyes dark; large. Rostrum to base of second coxæ.

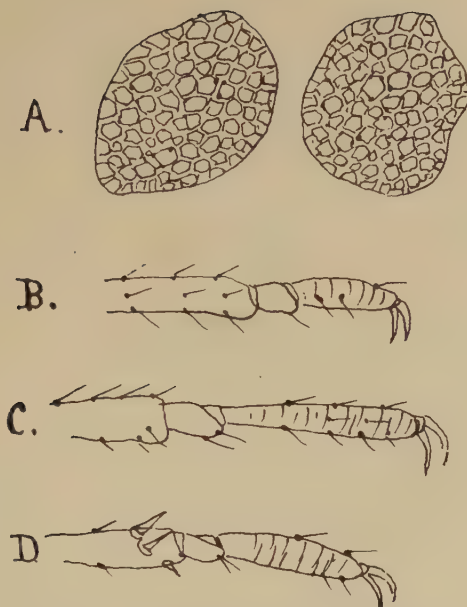


Fig. 143.—*Pemphigus bursarius* Linnæus.

A. Wax plate of fundatrix ; B. Tarsus ; C. Tarsus of fundatrigenia (fore leg) ; D. of virgogenia.

FOOD PLANTS. *Populus* spp.; *Lactuca*; *Sonchus*; *Lapsana*; *Chenopodium* and *Daucus* roots.

LOCALITIES. Great Staughton, Hunts., x. 09; Ramsgate, vi. 25; Ealing, vi. 84; Kew, vi. 97 (F.V.T.); Great Salkeld, 7 x. 12 and 7 ix. 14 (Britten); Rothamsted, 19 ix. 05 (Davidson); Haddenham, Cambs., 27 vi. 11 and 25 xi. 11; Bilting, near Wye, 9 vii. 11; 13 vii. 15; 25 x. 11 and 30 ix. 15; Ulcombe, near Maidstone; Paddock Wood and Swanley, x. and xi.; Okehampton, Devon, vii. 09 (F.V.T.); East Malling, Kent, vi. and vii. 28 (Massee); Sheerness, vi. 28 (Duffield); Quantock Head, Somerset (Tukin); Bexhill, 20 viii. 28; Isle of Eigg, Hebrides, 17 ix. 11 (Donisthorpe); Norwood, Kent; Gainsboro', Lincs.; Kettering, Yorks.; Aberdeen, etc., etc. (B.M. Coll.).; Belgium (Schouteden).

Observations. Some confusion seems to have occurred over this species. Lichtenstein figured Linnæus' *Aphis bursaria* (Les

Pucerons, Pl. III., Figs. 1 and 2) in 1885, the galls being very marked. In the same work Lichtenstein figures *Pemphigus pyriformis* (Pl. I., Figs. 1 to 5). According to Tullgren (Arkiv. f. Zoologi., V., 114, 1909) Lichtenstein's *pyriformis* is only Linnæus' *bursaria* and thus his *bursaria* is another species renamed by Tullgren *Lichtensteini*. In 1856 Passerini (La Giardini, III., 262) described a *Pemphigus* as *lactucarius* from the roots of Lettuce, etc. This is now known to be the same as Linnæus' gall former on Poplars—*bursaria*. That the common Poplar gall Aphid



Fig. 144.
Galls of *Pemphigus bursarius* Linnæus.

described here is the same as Passerini's *lactucarius* is undoubted. The root form on Lettuce, Sowthistle and some species of *Chenopodium* is noticed from late August to November. Alatae may begin to appear during the latter half of August and they go on doing so until December. What happens to the early ones we do not know, but those from October to December fly away and such as settle on Poplars produce young which become sexuales and there the ova are laid. At the same time it is well known that the Lettuce root form (*lactucarius*)

may live in the soil for at least two years. Now and then this Aphid does much harm to Lettuce plants and the writer in 1925 visited a farm near Ramsgate on which a large area of Lettuces, just ready for market, were killed by this insect, the farmer losing over £50 worth of plants. As a rule it is the late Lettuces that suffer and the very early spring ones. As they live over



Fig. 145.
Galls of *Pemphigus bursarius* Linnæus.
A. Gall cut open.

the year in the soil, the latter should be dressed with naphthalene and then dug in and all old stumps or dead lettuce should be destroyed. The apteræ and larvæ on Lettuce roots produce a good deal of white wool, which make this insect readily noticeable on pulling the plants for market or private table use.

PEMPHIGUS FILAGINIS Fonscolombe.

- Aphis filaginis* Fonscolombe.
- Pemphigus gnaphalii* Kaltenbach.
- Prociphilus gnaphalii* Koch.
- Pachypappa marsupialis* Koch.
- Pemphigus ovato-oblongus* Kessler.
- Pemphigus marsupialis* Lichtenstein.
- Bryocrypta filaginis* Schouteden.

Fonscolombe, Ann. Soc. Ent. Fr., X., 188 (1841) ; Kaltenbach, Mono. Pflanz., I., 180 (1843) ; Koch, Die Pflanz., 283, fig. 354 and 271 (a. p.) (*marsupialis*) (1857) ; Courchet, Mém. d. l'Acad. d. Montpellier, 48, 92, pl. V., fig. 3, 3a., pl. VI., figs. 2 and 7 (1879) ; Passerini, Aphid. Italicae, 73 (1863) ; Buckton, Mono. Brit. Aph., III., 128, pl. CXIX., figs. 1-4 (1881) ; Kessler, Die auf *Populus nigra*, u. *Populus dilatata*, vork. Aphid. Arten., etc. Ber. d. Ver. f. Natur. z. Kassel, XXVIII., 61, pl. VI., figs. 1-6 (1882) ; Lichtenstein, Mono. d. Puc. d. peupliers, 33, pl. II., figs. 1-3 (1886) ; Del Guercio, Prospetto d. afidofauna italica, 99 (1900) ; Schouteden, Mém. Soc. Ent. Belg., XII., 198, 199 (1906) ; Mordwilko, Biol. Zentralbl., XXVII., 772 (1907) ; Tullgren, Arkiv. f. Zoologi., 14, 128-130, figs. 60-64 (1909) ; Del Guercio, Redia, VII., 306 (1911).

Apterous viviparous female (Fundatrix). Green to greyish-green. Head, antennae and legs dark brown to purplish-brown. Pronotum often tinged with brown and also the apex. Ovale to elongate oval in form. Antennae short, of 4 segments ; i. much



Fig. 146.

Pemphigus filaginis Fons. Apterous ♀. (Fundatrix.)

wider but no longer than ii. ; iii. long, slightly swelling apically, primary sub-apical sensorium round ; iv. narrow and much shorter than iii., about equal to i. and ii. ; " nail " very small, with a few apical spiny hairs and a round sensorium at base. Rostrum rather short, reaches to or nearly to second coxae. Cornicles apparently wanting. Wax glands prominent, six rows of six and four on seventh segment. Legs short and rather thick.

Length 2.6 to 2.8 mm. In Poplar galls.

Alate viviparous female (Fundatrigenia). Head rich brown ; thorax dark brown, lobes shiny black. Abdomen bright green to dusky green, centre mottled, apex darkened. Antennæ dark brown to purplish-black. Legs dusky brown, with purplish hue when alive. Whole body covered with fine mealy powder. Antennæ of 6 segments, thick. Segment i. broader but shorter than ii. ; iii. longest, longer than iv. + v. ; iv. and v. about equal ; vi. a little longer than v. ; iii. has 13-18 annular sensoria on lower surface ; iv. with 3-7 ; v. with 4-7 ; vi. with 4-6 ; all these seem very irregular in balsam mounts ; " nail " small and stumpy, a somewhat transverse oval sensorium at base. Rostrum rather short and thick, reaches second coxæ ; a few short hairs. Wings often much covered with meal on emergence ; venation normal. Legs moderately long. Cornicles in some show as mere rings, in others slightly prominent.

Length 1.8 to 2.9 mm. In Poplar galls.

Apterous viviparous female (Virgogenia). Pale yellowish-white to pale yellowish-green, sometimes dull green and in a few almost grey. Head, antennæ and legs dark brown to dull purplish-black. Oval in form ; segments marked ; body with white meal and waxy threads, often entirely covering the insect. Wax glands

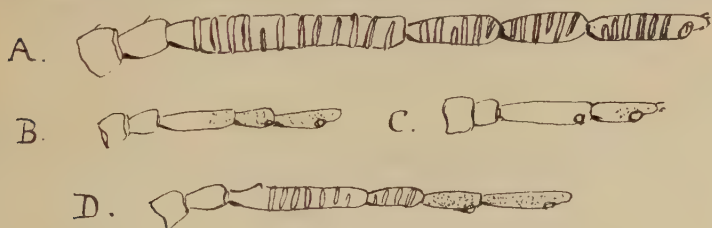


Fig. 147.—*Pemphigus filaginis* Fons.

A. Antenna of fundatrigenia ; B. of virgogenea ; C. of fundatrix ; D. of sexupara.

prominent, 4 on segments iii.-vi., lateral ones largest ; 2 on seventh segment. Antennæ of 5-6 segments, rather short ; i. about equal to ii. ; iii. about twice as long as ii., but narrower ; iv. half its length and thicker ; v. nearly as long as iii. ; " nail " very short and blunt, with marked fringed sensorium at base ; a similar one at apex of iv. Rostrum reaches about second coxæ. Cornicles not prominent. Legs short and stumpy.

Length 2 to 2.2 mm. On *Gnaphalium* sp.

Alate viviparous female (Sexupara). Head and thorax dark brown; lobes darkened, often shiny. Abdomen various shades of green and darker green bands, often mottled dusky areas. Antennæ brown to dull purplish-brown or black with pale bands. Legs deep brown to dull purple-brown. Antennæ of 6 segments, short; i. and ii. are about equal in length or ii. the longer; iii. longest and about equal to iv. + v., which are nearly equal; vi. longer than v.; iii. with 7-9 unequal sized sensoria on under side; iv. with 2-4; last 2 with no secondary sensoria, with minutely spinose imbrications. Rostrum to second coxæ. Wings normal. Cornicles not outstanding. Legs rather long and narrow.

Length 1.7 to 2.5 mm.



Fig. 148.—*Pemphigus filaginis* Fonscolombe. Wings.

Oviparous female. I have not seen the sexuales but Buckton describes the sexual female as follows: "Oblong, dull yellow. Eyes very small. Antennæ short and simple, the joints restricted to 4. Legs very short. This sex is mouthless, the sucking organs being represented by buccal plates." It is doubtful if this is the sexual form. As far as I have observed this insect becomes alate in autumn and all leave the Cudweed, so that sexuales are unlikely to occur there.

FOOD PLANTS. *Populus* spp. and *Gnaphalium uliginosum*, etc.

LOCALITIES. Wye, 19 ix. 11 on *Gnaphalium*; 9 vii. 11, etc., on Poplars; Bilting, near Wye, vi. 22 and 28; Hailsham, Sussex; Farnfield, Notts., 4 ix. 15 (F.V.T.); Quantock Head, Somerset, vi. 28 (Tukin); Scotland (Hardy); Woking, Wisley, Clapham

(B.M. Coll.) ; Italy (Passerini) ; Germany (Kaltenbach) ; Bergen, Norway (F.V.T.).

Observations. There is no doubt but that this insect passes the winter in the egg stage on Poplars. The fundatrix coming from the egg causes a marked bloated gall on the mid rib of the Poplar leaf. This gall is sometimes elongated, at others inflated in a pouch-like manner (Fig. 149). The progeny of the Fundatrix become alate (Fundatrigenia) and fly off to the Cudweeds (*Gnaphalium spp.*) and there they give rise to the virgogenia—

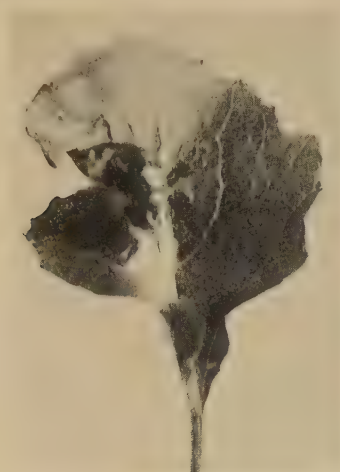


Fig. 149.
Gall of *Pemphigus filaginis* (*marsupialis*).

apterous females—which produce much white cottony secretion on this plant and frequently much stunted growth. Usually they swarm close to the ground and I have found them down in the soil, on pulling up infested plants, but they usually live amongst the leaves and flower heads, forming white woolly tufts. These give rise to nymphæ and then alate females, return migrants, the sexuparæ, which fly back in the autumn to the Poplars and evidently give rise to the sexuales. Tullgren places Koch's *Pachypappa marsupialis* as the same as *filaginis* and also Lichtenstein's *marsupialis* and I have adopted this provisionally, but there are certain discrepancies in regard to the antennæ.

PEMPHIGUS SPIROTHECÆ Passerini.

Pemphigus affinis Koch.*Kessleria spirothecæ* Lichtenstein.*Hamadryaphis spirothecæ* Kirkaldy.*Brysocrypta spirothecæ* Schouteden, etc.

Passerini, Gli. Afidi, 39 (1860); Aphid Italicae, 75 (1863); Koch, Die Pflanzenläuse, 290, figs. 360, 361 (1857); Courchet, Mém. Ac. d. Montpellier, 46, 89, pl. VI., figs. 4-8 and 11 (1879); Buckton, Mono. Brit. Aph., III., 122, pl. CXI., figs. 8-9 and pl. CXII., figs. 1-6 (1881); Kessler, Ber. d. Ver. f. Naturk. z. Kassel, 43, pl. II., figs. 1-20 (1882); Lichtenstein, Mono. d. Pucerons, 22, pl. III., figs. 3-4 (1886); Del Guercio, Prospetto dell afidofauna italica, Nuove relaz., Se. I., 2, 98 (1900); Schouteden, Ann. Soc. Ent. Belg., XLVII., 182 (1903); Theobald, Rept. S.E. Agri. Coll., 25, pl. II. (1903); Kirkaldy, Entomologist, 279 (1904); Schouteden, Mém. d. l. Soc. Ent. Belg., XII., 200 (1906); Tullgren, Arkiv. f. Zoologi., V 14, 155-161; figs. 76, 77 (1909).

Apterous viviparous female (Fundatrix). Green of various shades, with dusky to black head and legs. Round to elongate oval; head rather wide; slightly hairy. Antennæ of 4 segments, shorter than thorax; i. and ii. about equal; iii. shorter than iv., "nail" of latter small and blunt; an apical sensorium on iii. and one at base of "nail." Rostrum to about second coxæ. Cornicles wanting. Legs rather short, sparsely hairy. Six wax glands on segments i.-v.; 4 on vi. and 2 on vii.

Length 1.9 to 2.2 mm.

Alate viviparous female (Sexupara). Head and thorax dark brown to blackish. Abdomen pale to rich apple green with much white farinose matter. Antennæ and legs dusky. Antennæ of 6 segments; i. a little shorter, but wider than ii.; iii. longest with 5-6 partial annulations on apical two-thirds of segment; iv. shorter than v., expanding apically, 3-4 partial annulations on apical half; v. with prominent fringed sensorium at apex; vi. a little longer than v., "nail" very short and blunt, with a few short apical spines and a large round, fringed sensorium at base; last 2 segments with very fine spinose transverse lines. Rostrum to second coxæ. Cornicles wanting as such. Legs rather long, with a few short hairs. Wings normal.

Length 1.9 to 2 mm.

Sexuales. I have only seen these once many years ago.

Both oviparous female and male are apterous, arostrate and very small. Antennæ of female of 3-4 segments, length 0.5 mm.; the male 0.4 mm.

Buckton received specimens from Lichtenstein and says "both male and oviparous female are small and mouthless. The antennæ of the female of four articulations. The male shows the recurved male organ. The sizes of the sexes are for the female 0.02 inch (0.5 mm.), for the male 0.016 inch (0.3 mm.) They were captured in December.

FOOD PLANTS *Populus nigra* and *Populus spp.*

LOCALITIES Great Staughton, Hunts., 1898; Cambridge, vi. 93; Wye, vi. 01; Epping Forest, 27 vii. 20 and 1 viii. 20 (F.V.T.).

Observations. This *Pemphigus* which produces very marked gall's on the leaf stalks of the Poplars is apparently uncommon in Britain, but where I have found it the galls have occurred in



Fig. 150.
Pemphigus spirothecæ Passerini. Galls.

great numbers and in one instance at Cambridge a number of trees were somewhat seriously damaged. So far no alternate host is known to me and from the only two instances where I have had an opportunity of watching this insect it appears that the whole

life-cycle may be spent on the Poplars. In 1893 I found a great amount of this Aphid near the old Polo Ground at Cambridge. I then obtained what I see now were the sexuales and I can only quote from my notes, "The few I obtained died off early in November, the females each having previously deposited a single white ovum. I searched carefully and examined the soil microscopically from beneath two black poplars, covered by these galls, but did not find a single hibernator. The bark has also been closely examined without any result; a few (2 or 3) ova resembling those laid by the insects I kept, alone being found. I feel confident nevertheless that some do hibernate, but probably in the louse stage, for several eggs laid in October showed by the end of the month a well formed embryo within the shell." Löw stated that the sexual forms produced by what he calls the second winged females are said to hibernate, Löw having observed them pass into the ground. In several of the galls examined in January kept in ordinary temperature I found a small ball, about one-tenth to one-eighth of an inch long. Each ball was nearly round but some almost polygonal, often of a yellow colour and quite transparent, resembling a drop of honey dew or gum. Others were covered with a fine coat of white threads. Lichtenstein found these galls still tenanted by winged females in December and informed Buckton that he kept some in confinement during the winter of 1878 and that from them he bred non-rostrate males and females and later that he had obtained an egg from one of these in the following May, which hatched into a female and found she soon commenced to form a gall. Laing has specimens collected in Devon and named by Bagnell *spirothecæ*, but he says they do not seem to be this species.

PEMPHIGUS BOREALIS Tullgren.

Arkiv. f. Zoologi., v. 14, 142, figs. 67, 69 (1909) and Aphid Stud., II., 30 (1925).

Alate viviparous female (Fundatrigenia). Head and thorax dark brown; thoracic lobes black. Abdomen greenish-grey, dark at apex. Legs and antennæ blackish. Antennæ of 6 segments, i. and ii. about equal; iii. slightly longer than vi., with 14 annular sensoria; iv. a little shorter than v., with 4-5 sensoria; v. with 6-7 sensoria; vi. with 8-10 on basal area, "nail" very small

and spinose ; a large primary sensorium at its base and a small primary one at apex of v. Rostrum reaches to or just past second coxæ. Cornicles as rings. Legs long and narrow, with many hairs. Wings normal.

Length 2 to 2.6 mm.



Fig. 151.

Pemphigus borealis Tullgren. Antenna of alate ♀.

FOOD PLANTS. *Populus* ; *Lactuca* and *Taraxacum*.

LOCALITIES. Great Staughton, Hunts., 24 vi. 04 (F.V.T.) ; Gestrikland, Årsunda ; Rosendal and Ulriksdal, Stockholm (Tullgren).

Observations. I have only found this species once, numbers occurring in the soil on lettuce and other roots, where they were depositing their young. The alate females exactly agree with



Fig. 152.

Pemphigus borealis Tullgren. Galls.

Tullgren's description and figure. The gall resembles that of *bursaria* of authors. Tullgren describes the Fundatrix, which is greyish-green with brown head and legs. Body with protecting

down. Antennæ of 4 segments, 3 the longest. Cornicles seldom complete. Legs short and robust.

Length 3 mm.

Evidently the alatae I found had migrated from the galls and this points to the virgogenia and sexuparae occurring in the soil probably normally on lettuce roots. They also occur on *Taraxacum* roots (Tullgren).

PEMPHIGUS GLEBÆ Jackson.

Jackson, Scottish Naturalist, April, 1918,

Virgogenia. "Pale green or pale ochreous green, covered with fine close farinose matter, and with eighteen long tufts of white waxy substance on the posterior part of the abdomen; legs and antennæ greyish-ochreous, covered with white tomentum, in some specimens appearing pale grey; anal plate pale brownish-grey. There is a pale dorsal patch on the head. Proboscis pale ochreous, base and tip pale greyish-brown. Body elongate oval in shape. Antennæ reach to coxæ of second pair of legs and consist

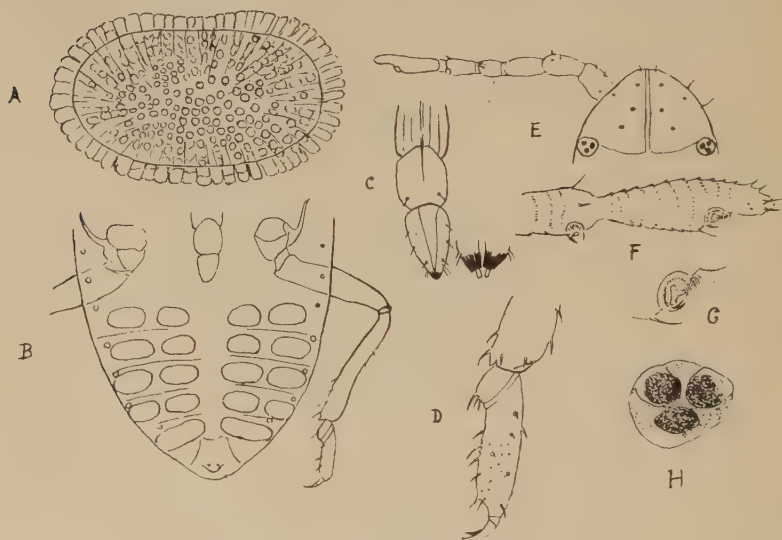


Fig. 153.—*Pemphigus glebæ* Jackson.

A. Wax plate; B. Wax plates in body; C. Apex of rostrum; D. Hind tarsus; E. Head and antenna; F. Apex of antenna; G. Rhinarium; H. Eye (after Jackson).

of 5 segments. The first has 1-2 short hairs ; second slightly longer than first and has 3 short hairs towards its apex ; third much longer than second, and beyond the middle it has a pale division which almost divides the joint into two—it bears 2 short hairs at the apex. Fourth segment about same length as second, and has a large sensorium at its apex surrounded by fine hairs ; above it are 2 short hairs. The distal portion of the joint is faintly imbricated. The fifth segment is about same length as third, imbricated faintly, with a hair preceding the rhinarium, and several hairs at apex of segment. The rhinarium is conspicuous and provided with fine hairs. Eyes consist each of 3 black pigment spots. Proboscis reaches just beyond coxæ of third pair of legs. Second joint short and broad with two fine short hairs toward distal end ; third joint slightly longer than second, and with 5 pairs of fine short hairs. The tip of this joint is very dark. The wax gland plates are situated on the 5 posterior segments of the abdomen in pairs on either side of the median line, excepting on the last segment where there is on each side only one long plate. Plates variable in size and shape. Each plate has a double contour ; inner portion consists of a great number of more or less spherical cells arranged in radiating lines—these usually converge towards the centre, but occasionally towards one corner of the wax plate. The inner contour of each plate is conspicuously marked by a dark line ; the outer contour is formed by the outer edges of a row of elongated cells which are arranged side by side. These cells are usually larger and of a different shape from those in the centre of the wax plate. The legs have the tibiæ furnished with a few hairs at the apex ; the tarsi also bear a good many hairs throughout length.

Length $1\frac{1}{2}$ mm."

FOOD PLANT. Unknown.

LOCALITY. Swordale, Evanton, Ross-shire.

Observations. Found by Miss D. J. Jackson in a flower bed in her garden on October 22nd. She writes : " My attention was attracted to a small lump of soil that was covered with a whitish powder ; on examining it I found these aphides in it surrounded by flaky white wool. I could not discover any root associated with them. The plants in the immediate neighbourhood were roses, daffodils, azalea and weeds such as grass and buttercup

(*Ranunculus*) were plentiful." The paratype she sent me has antennæ of 5 segments.

PEMPHIGUS AURICULÆ Murray.

Trama auriculæ Murray.

Tychea eragrostidis Buckton (non Passerini).

Rhizobius graminis Buckton.

Geocica auriculæ Laing.

Pentaphis auriculæ Laing.

Murray, Gard. Chron., 570 (1877); Buckton, Mono. Brit. Aphid., IV., 89 (1882); Laing, Ent. Mo. Mag., 3, Se. IX., 245 (1923) and LXII., 211 (1916).

Alate viviparous female. Head brown; prothorax green; meso- and meta-thorax black, sides pale, often green; abdomen dark green, much darkened at apex; legs deep brown, coxæ and base of femora paler, almost green. Antennæ shorter than head and thorax, of 5 segments; rather thin; segment ii. considerably longer than i.; iii. longest, about equal to iv. + v. with 9 to 10 narrow linear sensoria; in one specimen with 9, 7 of which are narrow and elongate, then a broader one and then 2 narrow curved



Fig. 154.

Wings of *Pemphigus auriculæ* Murray (after Laing).

ones. Cornicles absent. Eyes moderate. Rostrum past second coxæ. Glands marked, a median pair on pronotum, another pair on mesonotum and on metanotum; 5 median and 7 lateral pairs on abdomen and a large single transverse gland in front of cauda. Metascutum minutely faceted. Cephalic ornamentation marked.

Length 2.5 mm.

Apterous viviparous female. White, dusky white, creamy or pale greenish-white, glabrous, covered more or less with white meal and wool, especially apically. Head and apex of body dusky. Legs dusky to deep brown. Eyes black, small. Antennæ less than one-third of body ; brown ; of 5 segments, rather thin :



Fig. 155.

Pemphigus auriculæ Murray. Apterous ♀.

i. smaller than ii., the latter from $1\frac{1}{2}$ to $1\frac{3}{4}$ length of i. ; iii. much longer than ii., not quite so long as v. ; iv. small, much shorter than iii. ; v. longest, " nail " small and blunt. Rostrum rather thick, apex dusky, reaching to third coxæ. Abdomen with four rows of wax glands, four in each row, the third and fourth rows

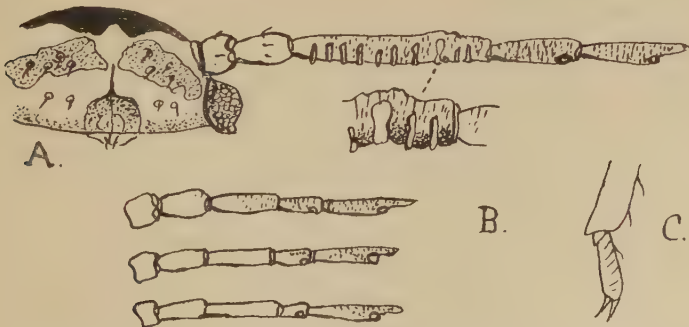


Fig. 156.—*Pemphigus auriculæ* Murray.

A. Head and antenna of alate ♀ ; B. Forms of antennæ of apterous ♀ ;
C. Hind tarsus. (A. after Laing.)

with deeply reticulate areas, the first and second showing faint ornamentation, each wax gland with a single hair ; behind the fourth row a large transverse wax gland, apparently two having fused.

Length 1.3 to 1.5 mm.



Fig. 157.

Pemphigus auriculæ Murray. Wax plates.

FOOD PLANTS. *Auricula* and *Primula* roots ; also Spruce and Grass roots (Laing).

LOCALITIES. Wisley, Surrey (Fox-Wilson) ; Cheshunt ; London ; Selsey Bill ; Worthing ; Exeter ; Wye (F.V.T.).

Observations. This and the following species are common pests on *Auricula* roots and may at first sight be confused, but the wax-glands and rostrum will at once demark them. I have specimens from grass roots and Mr. Laing records it on *Primula* and Spruce roots. It bears in its apterous form a close resemblance to *Tycheoides eragrostidis* but can at once be demarked from that grass root feeder, by the much longer antennæ and rostrum, thinner legs and the wax plate system. This insect has been taken by Mr. Laing to be Murray's *Trama auriculæ* and I have followed him, but the species I describe here as *Pemphigus pseudoauriculæ*

is so similar in general appearance that it might also be Murray's insect. I append the transcript from the Gardeners' Chronicle (May 5th, 1877).

" Extract from the Proceedings of the Royal Horticultural Society, May 2nd, 1877 : —Auricula disease. Mr. Andrew Murray made the following observation on this subject :—' The mystery attending the Auricula disease is now solved. At Mr. D'Ombraïn's suggestion Mr. J. T. D. Llewelyn of Unis-y-Gerwn, Neath, S. Wales has been kind enough to bring me a plant with the disease well established on it and bearing plenty of woolly aphid round its collar and about its roots. . . . One of the most remarkable things about the insect's appearance is that it seems to have been observed by Auricula growers all at once in different parts of the country at the same time. The injury that it has done in some cases has been very disheartening ; in others it appears to have been more easily kept under. Mr. Llewelyn has been so successful in exterminating it in his plant that he had to go to a less fortunate neighbour to obtain for me a plant that would show it in its characteristic state. Soft soap, water and tobacco powder was said to quickly destroy it, but the attack should be treated at once or mischief will be done."

This and the following insect are pretty general still and cause no little loss to Auricula growers, especially with pot plants.

Mr. F. Laing first reared the alate female of this species and placed it first in the genus *Geoica* and on having found the alate female later in the genus *Pentaphis*. It seems to me to be a typical *Pemphigus* and I place it with the other Auricula species in that genus.

Laing mentions that he cannot separate Buckton's specimen of Passerini's *eragrostidis* or his *Rhizobius graminis* from his Auricula insects, consequently I have placed Buckton's species under this insect. Passerini's *eragrostidis*—a common Grass root feeder can at once be told by its shorter legs and very short antennæ and thick short rostrum. Laing also speaks of finding it on Conifer roots (Spruce). I have only found *Pemphigus piceæ* on Conifer roots and my *pseudoauriculæ* very closely resembles the latter species. I have also found *eragrostidis* around Conifer roots and recorded it as Burmeister's *Rhizobius pini* which may be the same.

PEMPHIGUS PSEUDOauriculæ sp. nov.

Apterous viviparous female. White to dusky white, some dirty brown. Antennæ very similar to *auriculæ*. Wax glands in four transverse rows of 4 glands each, round to elongate oval and behind them two larger glands, well separated, all bearing a single hair and all the glands with similar faint ornamentation. Rostrum thin and long, reaching to or past the third coxæ. Legs long and narrow. In some specimens the head is dusky. Eyes as in former species of 3 facets.

Length 1.3 to 1.5 mm.

FOOD PLANT. Auricula roots.

LOCALITIES. Great Salkeld (Britton); Windermere (Rymer Roberts); Cheshunt; Oxford; Wye; London; Swanley; Woking (F.V.T.).

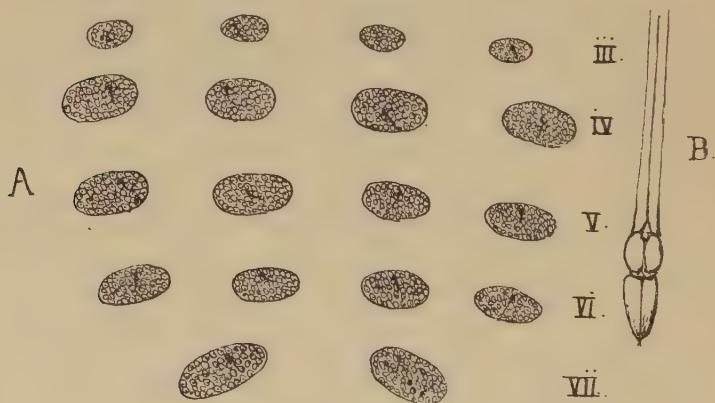


Fig. 158.—*Pemphigus pseudoauriculæ* sp. nov.

A. Wax glands of apterous ♀; B. Rostrum.

Observations. Common and harmful to Auriculas. It can at once be told from *auriculæ* as described by Mr. Laing by the longer rostrum and the markedly different wax plates, both in ornamentation and in the absence of the large transverse plate at the apex of the body. It bears a very close resemblance to *piceæ* and until *alatae* are bred from Auricula specimens it will remain in doubt if it is that species or, as I describe here, a new one.

PEMPHIGUS RUBIRADICIS sp. nov.

Apterous viviparous female. Ovate; a dirty greenish-brown; antennæ, legs and apex of rostrum deeper brown; abdomen with flocculent white wool. Antennæ rather thin, only a little longer than the head; of 5 segments; i. shorter than ii.; iii. longer than ii., not quite so long as v.; iv. small, not quite half iii.; "nail" very short and blunt; primary sensoria normal. Eyes black, of 3 facets. Rostrum rather broad, reaching to or not quite to the second coxæ. Legs of moderate length, rather thick; four spines at apex of tibiæ and two on the first tarsal segment. Abdomen without hairs. Wax plates small, more or less round, one or two slightly broadened; in four transverse rows, four in each row and two small round ones behind; all of similar faint ornamentation and each with a single hair.

Length 1.7 to 2.2 mm.

FOOD PLANTS. Raspberry roots.

LOCALITY. East Malling, Kent (Steer).

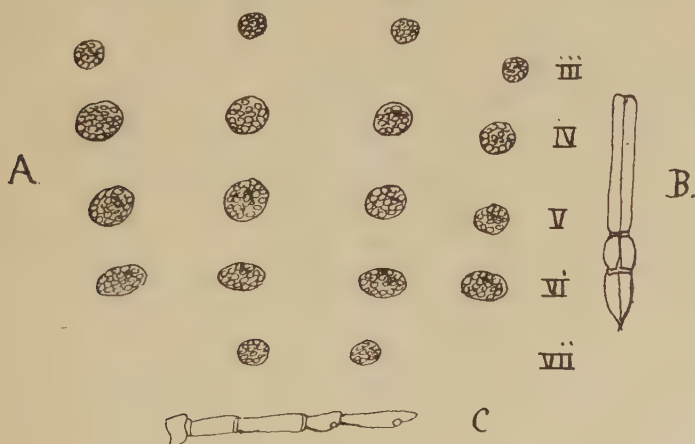


Fig. 159.—*Pemphigus rubiradicis* sp. nov.

A. Glands on abdomen; C. Antenna; B. Rostrum of apterous ♀.

Observations. Described from several mature apteræ. Mr. Steer said they produced much white wool, when feeding on the roots. It is easily demarked by the small round wax plates, from which character it can easily be separated from *Pemphigus auriculæ*.

Murray and *Pemphigus pseudoauriculæ* sp. nov. The rostrum is short as in *auriculæ*, not long as in *pseudoauriculæ*. It is also a dingier colour and larger than either of those species.

Types in the writer's collection.

Genus PHLOEOMYZUS Horvath.

Löwia Lichtenstein.

Horvath, Wien. Ent. Zeit., XV., 5 (1896) ; Lichtenstein, Mono. Puceron. Peupl., 37 (1886) ; Baker, Bull. 826, U.S. Dept. Agri., 72 (1920) ; Hall, Bull. 68, Tech. and Sci. Service, Min. Agri., Egypt, 46 (1926).

The genus *Löwia* was founded by Lichtenstein in 1886 for the *Schizoneura passerinii* of Signoret. This name being preoccupied Horvath in 1896 renamed it *Phloeomyzus*. Baker placed it provisionally in the *Pemphigini*. It seems to me to lie in a new Sub-tribe, coming near the *Eriosomatini* or else the *Phyllaphidini*.

The characters are: antennæ of 6 segments in the alate female without any secondary sensoria and rather long and thin. Cornicles very slightly elevated. Abdomen with large wax glands. Wings flat in repose; fore pair with media once branched; hind with media and cubitus. Apteræ with antennæ of 5 segments, some show a trace of a sixth. Oviparæ and males alate, their antennæ show no secondary sensoria; oviparæ with two eggs. Cauda rounded, anal plate slightly bilobed to almost rounded.

PHLOEOMYZUS PASSERINII Signoret.

Schizoneura passerinii Signoret.

Löwia passerinii Lichtenstein.

Signoret, Bull. Soc. Ent., Fr. (5), CCII. (1875) ; Lichtenstein, Mono. Pucerons Peupl., 37 (1886) ; Horvath, Wien. Ent. Zeit., XV., 5 (1896) ; Hall, Bull. 68, Tech. and Sci. Service, Min. Agri., Egypt, 46 (1926).

Alate viviparous female. Antennæ of 6 segments; thin; about as long as head and thorax; segment i. smaller than ii.; iii. longer than iv., about as long as vi.; no sensoria present; iv. shorter than v., which is nearly as long as vi.; vi. with very short blunt "nail"; primary sensoria on v. and vi. normal. Rostrum long, thin, reaching past third coxæ. Cornicles very

small, slightly elevated, truncate. Cauda and apex of body rounded. Anal plate small, bilobed. Legs rather short and thick. Eyes large. Three small stemmata. Head and thorax dark ; abdomen green. Legs and antennæ darker than body. Wing veins clouded each side with brown.

Length 1.5 mm.

Apterous viviparous female. Pale yellow, pale yellowish-green to dull white, slightly mealy, with dusky legs and lateral tufts of white or bluish white woolly and waxy matter each side towards the apex. Head dusky. Antennæ brown or smoky,

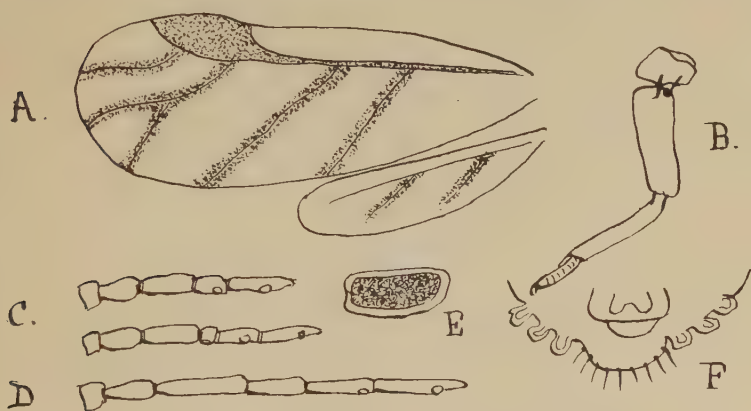


Fig. 160.—*Phloeomyzus passerinii* Signoret.

A. Wings of alate viviparous ♀ ; B. Hind leg ; C. Antennæ of apterous ♀ ; D. of alate ♀ ; E. Wax gland ; F. Apex of body.

pale between the segments, very short, reaching just past the first pair of legs, of 5-6 segments, when of 5 as follows : i. wider but shorter than ii., iii. slightly longer than iv. but not so long as vi., a little longer than ii. ; v. slightly swollen, blunt, nearly as long as iii. + iv. ; sensorium on iv. round, very small ; when of 6 segments i. much smaller than ii. ; iii. longer than ii. but twice as long as iv. ; v. not quite so long as iii. ; vi. longest. Similar in form to the 5 segmented ones. Rostrum very long, reaching past the third coxæ, acuminate. Eyes very small, black. Legs short, scarcely projecting beyond the body, thick. Anal plate and cauda rounded ; on each side the body has three rather large

blunt projections. Two wax plates each side in front of cauda. Cornicles inconspicuous.

Length .8 to 1 mm.

Male. Alate. Head and thorax dark ; body green ; cleared specimens show two dark median patches on each segment, the apical pair nearly uniting and dusky lateral spots. Legs and antennæ dark. Genitalia dark. Antennæ not quite so long as thorax, of 6 segments, thin ; i. and ii. about equal or ii. longer ;

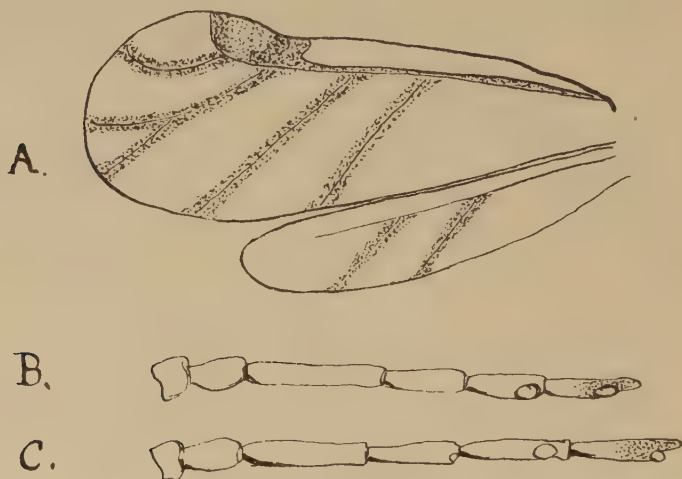


Fig. 161.—*Phloeomyrus passerinii* Signoret.

A. Male wings ; B. Male antenna ; C. Oviparous female antenna.

iii. the longest, not quite so long as iv. + v. ; iv. slightly shorter than v. ; vi. a little longer than v., " nail " very small and blunt ; sensoria on v. and vi. large. Rostrum thicker than in apteræ, reaching past second legs, apex dark. Eyes large. A dark patch in front of the head and dark lateral patches. Legs moderately long. Cornicles very small, but marked, slightly projecting, dark. Wings normal.

Length 1 mm.

Oviparous female. Alate. Antennæ nearly as long as head and thorax ; segment i. smaller than ii. ; iii. the longest ; iv. more than half of iii., shorter than v. ; v. and vi. about equal ;

the sensoria on the two latter normal. Eyes large. Two ova in each. Wings normal.

FOOD PLANT. *Populus alba*.

LOCALITIES. Manchester, 7 vii. 14 (Gordon Hewitt) ; Malvern 15 ix. 15 (F.V.T.) ; South Kensington (Laing) ; West Kensington, London, 29 vi. 14 (F.V.T.) ; Gizeh, Egypt, xi. 13 (Willcocks) ;



Fig. 162.

Phloeomyzus passerinii Signoret on Poplar.

Kafrel Dawar, Egypt, 21 x. 23 (Hall) ; Damanhour, Egypt, i., v., vi. x. and xi. (Hall) ; Russia (Cholodkovsky).

Observations. A very marked Aphid easily distinguished when alate by the wings. The apteræ form white woolly masses on the Poplar bark (*Populus alba*) often thickly encrusting the trees as

shown in the photographs reproduced here. From notes sent me by the late Dr. Gordon Hewitt it seems to have been very abundant near Manchester. It also occurred in masses in London and on some white Poplars at Malvern. It has probably been introduced into Egypt.

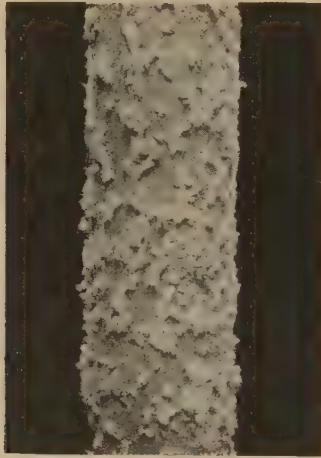


Fig. 163.

Phloeomyzus passerinii Signoret on *Populus alba* (Willcocks).

Tribe ERIOSOMATINI.

The species of this tribe form true galls, pseudo-galls and also leaf curling. Both aerial and subterranean stages occur in some species and probably both always do so or have done so in past ages. The galls and pseudo-galls may be formed on the leaves or on the wood, when on the latter both above and below ground. The pseudo-galls are in the form of excrescences as we see caused by the Woolly Aphid. Prominent wax glands occur more or less in all the species. Cornicles are present but never very prominent or raised. The antennæ of the alataæ females have annular sensoria, which may almost entirely encircle the segments. The sexuales are very small, apterous and arostrate. Each oviparous female lays but a single egg.

The genera *Gobaishia*, *Tetraneura*, *Truncaphis* and *Eriosoma* occur in Great Britain.

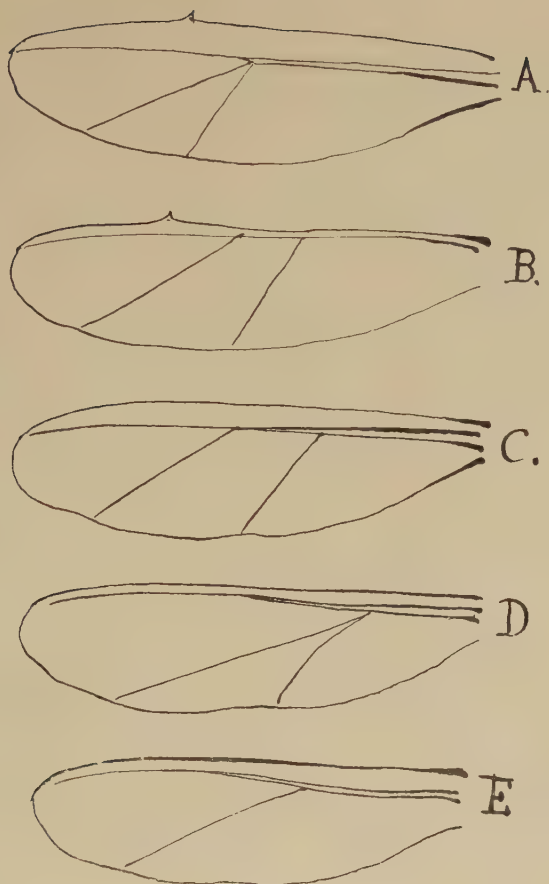


Fig. 164.

A. Hind wing of *Pachypappella reaumuri* Kalt ; B. of *Eriosoma lanigerum* ;
C. of *Anoecia corni* ; D. of *Eriosoma ulmi* ; E. of *Colopha compressa*.

Genus ERIOSOMA Leach.

Myzoxylus Blot.

Schizoneura Hartig.

Mimaphidus Rondani.

Leach, Trans. Hort. Soc. London, III., 60 (1818) ; Samouelle, Useful Compendium, 232 (1819) ; Blot, Mem. Soc. Roy. Agr. et d. Com. Caen, III., 332 (1831) ; Rondani, Nuovi Annali d. Sc.

Natur., se. 2, IX., 35 (1848) ; Hartig., Jahresh., ü. d. Fortschr. d. Forstwiss, u forstl., Naturk., I., 645 (1837) ; Germais, Zeitschr. f. Ento., III., 367 (a.p.) (1841) ; Kaltenbach, Mono. Pflanz., 167 (a.p.) (1843) ; Koch, Die Pflanz., 262 (a.p.) (1857) ; Passerini, Aphid. Italicæ, 68 (a.p.) (1863) ; Buckton, Mono. Brit. Aph., III., 88 (1881) ; Del Guercio, Prosp. d. afido fauna italica, 102 (1900) ; Mordwilko, Ann. Mus. Zool. d. l'acad. Imp. d. Sc. de Petrograd, XIII., 368 (1908) ; Tullgren, Aphido-Studien, I., Arkiv. f. Zoologi, V., no. 14, 162 (1909) ; Baker, Bull. 826, U.S.A. Dep. Agri., 66, Pl. IX, M-T. (1920).

Species living in galls, or gall-like excrescences on their host plants, both above and below ground, or causing leaf-curling. Cornicles present, either level with the surface or on very slightly elevated tubercles. Apterous females with antennæ of 6 segments, but the Stem-mother with 5 segments. Alatæ with 6 antennal segments, with annular sensoria. Wax plates are present in both alatæ and apteræ and much woolly or waxy material is produced by them. Front wings with media once forked, hind pair with both media and cubitus. Both cauda and anal plate rounded. Sexual forms very small, apterous and arostrate. Oviparæ lay only a single egg. The genus was known as *Schizoneura*, Hartig having created it in 1837 and *ulmi* was made the type by Passerini in 1860. But as far back as 1818 Leach gave the Woolly Aphid the generic name *Eriosoma* and in 1819 it appeared definitely in Samouelle's "Useful Compendium," Leach's name being characterised. Without knowing this Blot in 1824 made the genus *Myzoxyle* and corrected this to *Myzoxylus* in 1831, taking *Aphis lanigerum* as the type. In 1848 Rondani placed the *ulmi* of Fabricius as the type of the genus *Mimaphidus*.

Samouelle's original description is as follows :—"Abdomen without tubercles or horns ; antennæ short and filiform ; body tomentose.

The Eriosomata form what are called improperly galls on the stalks of trees near their joints, which are in fact excrescences caused by the effects of nature to repair the damage done to the old trees by the perforation of those insects, whose bodies are covered with down. Leach's MSS., Sp. I., *Er. mali*. *Aphis lanigera* of authors."

The members of this genus migrate to the roots, etc. of other plants from the Elms. In America *E. lanigerum* normally

migrates to Apples, *E. americanum* to the roots of *Amelanchier canadensis*. In the Palæarctic region Mordwilko says that *E. lanigerum* does not migrate; *E. ulmi* to the roots of *Ribes*; *E. lanuginosum* to the roots of Pear, and he states that *E. ulmosedens* does not seem to migrate. *E. lanigerum* I find may migrate from Apple to Elm in this country and *E. ulmosedens* certainly migrates, but where to we do not know.

BRITISH *Eriosoma*.

1. *Eriosoma lanigerum* Hausmaun.
2. *Eriosoma ulmi* Linnæus.
3. *Eriosoma lanuginosum* Hartig.
4. *Eriosoma ulmosedens* Marchal.

Buckton's *Schizoneura fuliginosa* does not belong here.

FOOD PLANTS OF *Eriosoma*.

<i>Carpinus betulus</i>	<i>E. lanuginosum</i> Hartig.
<i>Cotoneaster vulgaris</i>	<i>E. lanigerum</i> Haus.
<i>Cratægus oxyacantha</i>	<i>E. lanigerum</i> Haus.
<i>Pyrus aucuparia</i>	<i>E. lanigerum</i> Haus.
„ <i>communis</i>	<i>E. lanigerum</i> Haus.
„ „	<i>E. lanuginosum</i> Hartig.
„ <i>malus</i>	<i>E. lanigerum</i> Haus.
„ <i>torminalis</i>	<i>E. lanigerum</i> Haus.
<i>Ribes grossulariæ</i>	<i>E. ulmi</i> Linn.
„ <i>nigrum</i>	<i>E. ulmi</i> Linn.
„ <i>rubrum</i>	<i>E. ulmi</i> Linn.
<i>Ulmus</i> sp.	<i>E. ulmi</i> Linn.
„ „	<i>E. lanuginosum</i> Hartig.
„ „	<i>E. lanigerum</i> Haus.
„ „	<i>E. ulmosedens</i> Marchal.

ERIOSOMA LANIGERUM Hausmann.

Aphis lanigerum Hausmann.
Coccus mali Bingley.
Eriosoma mali Leach, Samouelle.
Myzoxylus mali Blot.
Schizoneura lanigerum Hartig.
Schizoneura ulmi Woodworth.
Pemphigus pyri Fitch.
Eriosoma pyris Riley.

Hausmann, Mag. f. Ins. v. Karl. Illiger., I., 426-445 (1802) ; Bingley, Animal Biography, III., 200 (1803) ; Samouelle, Ent. Useful Compendium, 232 (1819) ; Leach, Trans. Hort. Soc. Lond., III., 60 (1820) ; Mosley, Trans. Hort. Soc. Lond., III., 54-60 (1920) ; Blot, Mém. Soc. Linn. d. Calvados, I., 84-115 (1824) ; Blot, Mém. Soc. Roy. Agri. e.d. Comm. Caen., III., 332 (1831) ; Hartig, Germars. Zeitsch. f. Ent., III., 359-376 (1841) ; Avrilly, Eure. Bul. Acad. Ebroux, II., 1-35 (1834) ; Amyot, Hist. nat. d. Insectes Hemip., 606 (1843) ; Fitch, 1st Rept. Nox and Benf and other Insects, St. N. York, 5 (1856) ; Goethe, Landw. Jahrb., 12, 563-571, Pl. 14 (1883) ; Oestlund, Aphid. Minnesota, 100 (1887) and Geol. and Nat. Hist. Survey Minn. Bull., 4, 27 (1887) ; (S. cratægi) ; Lignieres, Mém. Soc. Zool. Fr., IX., 70-86, Pls. 1 and 2 (1896) ; Tullgren, Arkiv. f. Zool., V., 4, 14, 170 (1909) ; Patch, Maine Agri. Exp. Sta. Bull., 181, 193-240 (1910) ; Patch, Bull., 203, 235-258 (1912) ; Patch, Science, n.s. XXXVI., 914, 30-31 (1912) ; Patch, Journ. Eco. Ent., V., 5, 395-398, Pl. 10 (1912) ; Theobald, Journ. Eco. Biol., VII., 3, 94-116, fig. 14, Col. Pl. 2, 3 (1912) ; Wilson, Canad. Ent., 44, 7, 219-220 (1912) ; Davidson, Quart. Journ. Micro. Sci., 58, n.s. 4, 653-701 (1913) ; Hewitt, Journ. Eco. Biol., VIII., 2, 95-98 (1913) ; Patch, Journ. Eco. Ent., VI., 3, 316 (1913) ; Woodworth, Univ. Calif. Agri. Exp. Sta. Circ., 102, pp. 4, fig. (1913) ; Baker, Rept. 101, U.S. Dept. Agri., pp. 55, Pl. XV (1915) ; Theobald, Journ. Pomol., II., pp. 19, figs. 11-17 (1921) ; and III., pp. 1-7 (1921) ; Schneider-Orelli u Hans Leuzinger Beiblatt. z. Vierteljahrsschrift. d. Naturforschenden Gessell in Zurich, No. 9, 71, p. 84 (1926).

Apterous viviparous female (on Apple). Colour varying from dull purplish to dark and pale purplish-brown, sometimes pallid brown or dirty purple. Legs and antennæ darker, sometimes almost black. Eyes black. Vertex dark. Covered with a grey meal and many waxy white threads, especially on abdomen. This secretion is woolly or fluffy white and often forms large masses on the colonies of insects. Antennæ of 6 segments and varying in length and in the relative lengths of the segments ; segment i. larger than ii. ; iii. the largest ; iv. the smallest ; v. a little shorter than vi. which has a short blunt " nail." The young forms have only 5 segments and several spines on antennæ, with marked imbrication. Rostrum thick, reaches second coxæ, rarely just beyond. Cornicles circular, with chitinous inner

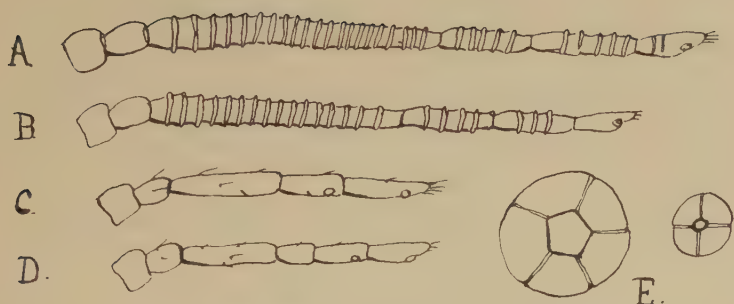


Fig. 165.—*Eriosoma lanigerum* Hausmann.

A. Antenna of alate ♀; B. Another form from apple; C. Antenna of young apterous ♀; D. of mature apterous ♀; E. Cephalic wax plates.

margins. Cauda and anal plate rounded, with many curved hairs. Marked wax glands present on head and abdomen. Body with rows of small hairs. The form varies, some pyriform, others almost rounded and some elliptical, depending upon the number of young within.

Length 1.7 to 1.9 mm.

Alate viviparous female (on Apple). Head and thorax deep brown to jet black. Abdomen rich brown to dull purplish. Paler lines occur on thorax, marking the divisions between the segments and in some appears a deeper coloured central abdominal plate. Posterior part of body bears many woolly white threads, often of a cottony and fluffy appearance and some smaller waxy and woolly areas occur on the anterior region. Woolly matter usually white, but now and then in certain lights a beautiful pale blue. Antennæ of 6 segments, the proportions of which vary even from the same



Fig. 166.

Wings of *Eriosoma lanigerum* Haus.

colony. Segment i. almost the same size as ii. ; iii. the longest ; iv. small ; v. a little longer ; vi. shorter than v. ; the " nail " small ; iii. with 16-24 annular or partially annular sensoria ; these annulations are mainly ventral ; segment iv. has 3-6 and v. 3-6 annular sensoria ; but on v. there may be some fusion of the rings ; on vi. there are 0-3 annular sensoria and at the base of the " nail " a group of 1-2 oval fringed primary sensoria and a large star shaped sensorium at base of " nail." Rostrum extending to second coxæ. Wings ample ; costa prominent ; radial sector long ; median forked near middle and obsolete near base. Cauda and anal plate rounded and armed with many hairs. Cornicles similar to apterous female.

Length 1.6 to 2.2 mm.

Male. Reddish-brown to purple with a bluish-white waxy coating ; apterous ; small. Antennæ of 5 segments, short ; ii. slightly longer than i. ; iii. not quite twice as long as ii. ; iv. small, about size of ii. ; v. longest. Abdominal segments with a few hairs. Anal and genital plates with many hairs. Claspers dark, small, curved, with a curious fan-shaped process protruding between them, the penis.

Length 0.59 mm.

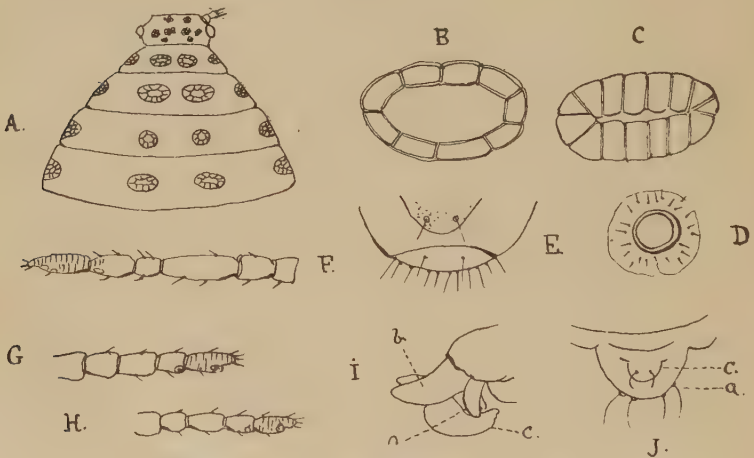


Fig. 167.—*Eriosoma lanigerum* Hausmann.

A. Wax plates of apterous ♀ ; B. and C. Further enlarged wax plates ; D. Cornicle ; E. Apex of body ; F. Antenna of apterous ♀ ; G. and H. Antennæ of ♂ and oviparous ♀ ; I. Sexual appendages of ♂, (c) penis ; (a) claspers ; J. Anal plate (a) and cauda (c) of oviparous ♀.

Oviparous female. Apterous, very small. Reddish-brown, now and then with a pale purple or green hue, with a slight mealy covering. Antennæ short of 5 segments; i. and ii. nearly equal; iii. a little longer and not quite equal to iv.; v. the longest.

Length 0.7 to 0.9 mm.

FOOD PLANTS. Apple; Hawthorn; Sloe; Elms; Cotoneaster; Salix; and the Mountain Ash in America.

LOCALITIES. All over Great Britain and Europe; Africa; India; Australia; New Zealand and America.

Observations. The damage caused by this insect, often called American Blight, may be very serious to apples. The insects puncture the young wood and boil-like swellings arise; as the wood grows these swellings increase and then split and become large rough galled areas, in the crevices of which the Woolly Aphides live and breed. Similar damage is done to the roots near the trunk. Leaves are also invaded and even the fruit is attacked when the pest is very severe. It has been observed in and around the core of an apple in Ireland by Hewitt and I have seen it several times lately in the core of apples imported from New Zealand. Not only does this insect cause direct damage, but their punctures encourage the growth of the Canker Fungus. It is spread naturally by means of the wind blowing the masses of white flocculent wool about with young insects in it and the same is also carried about by birds and some insects. The chief means of dispersal is by means of infested nursery stock and doubtless in this way it has become a world wide apple pest.

The life-history is somewhat complex. Its normal life as traced in North America seems to be asexual reproduction on the apple and a migration to the Elms (*Ulmus*) in the autumn, especially to *Ulmus americanus*, where sexuales are produced and each oviparous female lays a single egg. In parts of Europe (Russia, etc.) no sexual brood occurs, that is there is no migration to the Elm. In Switzerland Schneider-Orelli and Hans Leuzinger have found that they fly to Elms and produce apterous males and females, the latter oviposit and the eggs hatch, but the young do not normally mature. In the South of England I have observed a definite migration to Elms, where sexuales occurred and the

young developed and the alatae produced in summer flew back to apple. This was also traced experimentally in closed muslin cages and in the open. The species of Elm upon which *lanigerum* was bred and found were *Ulmus montana* and *Ulmus campestris* and another I do not know. The single egg laid by the female is at first brown, then black and is more or less covered with the dead skin of the female. Early in March on to April the eggs hatch and the young larvæ wander about until they find a resting place near a bud or on a young shoot near the base of the tree. On the Elm the larva grows very slowly and ensconces itself in a curled leaf and when the Stem Mother's stage is reached she produces many young and the curled leaves produce a tuft very similar to that produced by *E. ulmosedens*. Amongst the curled leaves the young and adults produce much white wool, mixed with mealy coated oil globules. In late June and early July they become winged and fly away. These viviparous alatae if they settle on apple produce young which give rise to the white woolly masses of apteræ. Now and then in late August, September and on to October alatae appear on apple trees and these migrate. I have transferred these autumn alatae to Elms in muslin cages and they produced sexuales. Whether this is general in a state of nature in Great Britain I do not know. It certainly takes place in this country now and then, just as it does in America as has been clearly traced by Miss Edith Patch. Although this is the normal life-cycle it is well known that *lanigerum* breeds all the year round on Apple and in countries where there are no Elms it must do so entirely.

Marchal described an Elm species producing leaf rosettes on Elms as *Eriosoma ulmosedens* and later he considered this to be *lanigerum*. Mordwilko pointed out that *ulmosedens* is the same as his *Eriosoma phœnax* and that it differs from *lanigerum* in regards to the antennæ and in the wax glands. Marchal's *ulmosedens* is certainly a distinct species as he has recently shown.

There are undoubtedly two ways in which *lanigerum* lives, just as we find with *Tetraneura ulmifoliæ* Baker and *Aploneura lentisci* of Passerini. In the former a migration takes place between *Ulmus* and various grass roots, a sexual generation appearing on the Elms and asexual generations on the grass roots, where there are no Elms we get the ground form still persisting. It is presumed that Elms at a far distant period

existed in those localities. The same with the Pistacia Gall Aphid (*Aploneura lentisci*) which occurs in Great Britain as a ground form where no *Pistacia* now occurs.

On more than one occasion I have found arostrate oviparae of *lanigerum* ovipositing on the Apple close to the ground and figured a photo of such an egg in "The Insect and Allied Pests of Fruit." A third cycle also occurs with the Woolly Aphid, namely a migration between the roots of the Apple and the trunk of the tree. The movement from the roots upwards takes place mainly in June, but may start as early as the beginning of May. The insects begin to descend to the roots in September and I have traced them doing so into November. At the same time some of the subterranean forms persist on the roots all the year round. This ground form mainly occurs on the roots from close to the trunk up to four feet away from it. Galls are produced on the roots similar in form to those above ground and have apparently now and then been mistaken for "Crown Gall." Two varieties of Apples are immune or strongly resistant to the attack of this Aphid, the Northern Spy and the Winter Majetin, both of which if used as root stocks prevent the worst form of attack. Although largely employed in Australia, etc., they do not seem to meet with approval in this country.

This Apple pest is best controlled with us by spraying in winter with Tar Distillates, by grease banding to stop the upward and downward migrations to and from the roots and by painting the patches of wool with methylated spirits. The Woolly Aphid is subject to many Natural Enemies, especially Birds, including all the family of Tits (*Paridae*), the Chaffinch (*Fringella coelebs*) and the Tree Creeper (*Certhia familiaris*) and I have observed Sparrows devouring them. A few Lady Bird Beetles, especially *Adalia bipunctata*, feed on them and several Syrphids, such as *Syrphus ribesii* and *Catabomba pyrastris* now and then are to be found devouring them. Another important enemy is the small parasitic hymenopteron—*Aphelinus mali*—but its introduction into this country does not seem to have been very successful. It spreads too slowly, even where it has taken, to help much in the control of this pest. The food plants of the Woolly Aphid seem to include Willows (*Salix*) for I have undoubted specimens from Willows found at Reading and at Camberley, the wax glands of the apterae exactly agreeing with specimens from Apple. In like

manner do those I found on the Sloe in large numbers at Widdington in Essex in 1922.

ERIOSOMA LANUGINOSUM Hartig.

Schizoneura lanuginosa Hartig.

Aphis ulmi Boyer.

Aphis lanuginosa Ratzburg.

Lachnodaphis Amyot.

Schizoneura lanuginosa Walker.

Hartig, Germar's Zeitschr. f. Entom., III., 367 (1841); Kaltenbach, Mono. Pflanz., 170 (1843); Ratzburg, Forst. Ins., III., 220, pl. 13 (1841); Boyer, Ann. Soc. Ent. Fr., X., 190, 33 (1841); Amyot, Ann. Soc. Ent. Fr., Se. 2, V., 483 (1843); Walker, List. Homop. (B.M.), IV., 1048, 3 (1852); Koch, Die Pflanzen., 264, figs. 339, 340 (1857); Passerini, Aphid. Italicæ., 70 (1863); Buckton, Mono. Brit. Aphid., III., 104, pl. CIX., figs. 5-10 (1881); Del Guercio, Prosp. dell Aphidofauna italica. Nuov. relaz., Se. 1, II., 104 (1900); Schouteden, Mém. Soc. Ent. Belg., XII., 202-4 (1906); Tullgren, Arkiv. fur. Zoologi., V., No. 14, 170, fig. 83 (1909).

Alate viviparous female. Almost entirely black; many white flocculent filaments posteriorly and meal over rest of body. Wings transparent; stigma blackish-green; veins thin, black. Rostrum

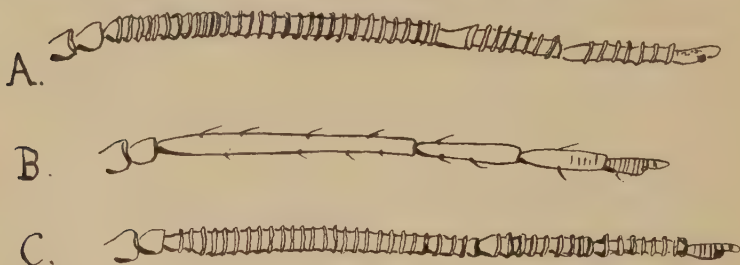


Fig. 168.—*Eriosoma lanuginosum* Hartig.

A and C. Antennæ of alate and B of apterous ♀♀; C. *Carpini* form.

dark, short, not reaching second coxæ. Cornicles mere pores. Antennæ shorter than head and thorax, of 6 segments; i. and ii. small, nearly equal; iii. longest, longer than iv. + v. + vi., with 30-35 annular sensoria; iv. a little longer to nearly as long as v., with 7 to 10 annular sensoria; v. with 6-8; vi. shorter than v.,

with short blunt "nail." At base of "nail" a well marked sensorium. Anal plate and cauda rounded, former with a few hairs. Legs normal.

Length 1.3 to 1.9 mm.

Apterous viviparous female. Black, slaty grey, blackish-green to deep green, smooth and shiny with much meal and white cottony matter. Oval to elongate oval. Rostrum black, reaching to second coxæ. Legs short and black. Eyes very small, black. Antennæ dark, of 6 segments; rarely 5; i. a little longer than ii.; iii. longest; iv. a little longer than v.; vi. shorter than v., with a short blunt "nail"; last 2 segments strongly imbricated; a few short hairs on all segments.

Length 1.2 to 1.5 mm.

FOOD PLANTS. Elms (*Ulmus campestris*; *U. suberosa* and *U. montana*); Pear (*Pyrus pyrastrer*); Hornbeam (*Carpinus betulus*).

LOCALITIES. Rainham, Essex (Brady in Buckton); Cambridge (Brown in Buckton); Maldon (Fitch in Buckton); Cambridge, 17 vi. 89; Kingston-on-Thames, vi. 90; Wye, 14 vii. 01 and 17 vi. 26; Exeter, 7 vi. 94 (F.V.T.); Windermere, (Rymer Roberts) and Hothfield (F.V.T.) on Hornbeam; Portsmouth; Herne Bay; Benges, Herts.; Wilmington, Kent; Cadnam, Hants.; Austria, Salonika, Morocco, etc., etc. (B.M. Coll.).

Observations. This *Eriosoma* forms large swollen galls at the ends of the twigs of several species of Elm. These gall-nests vary in size, some being $3\frac{1}{2}$ - $4\frac{1}{2}$ inches long and 2 or more inches wide; a few are stunted and only an inch in length. Several often occur close together, the writer once found fifty in one mass, two feet across. In colour when fresh they are a rich deep green, others brownish-green and they frequently have a reddish tinge on one side and as they ripen they become deep brown and gradually harden. The skin of the gall is more or less hairy and has longitudinal corrugations here and there, more marked in some specimens than others. The shape varies very much, some are fig-shaped, others pear-shaped, whilst others are irregular masses. These large, bloated galls are formed from a leaf. The inside of the nest is lined with a fine velvet-like pilosity. The galls are

fully matured by August, when they are found to contain a swarm of young and mature apterous and alate females. A small irregular opening is formed at or near the summit of the gall and from this the alatae pass out and fly away. The galls are also full



Fig. 169.

Eriosoma lanuginosum Hartig. Galls.
($\frac{1}{2}$ -natural size.)

of mealy and waxy substance and a glutinous liquid. Buckton says a second generation of winged forms come from the galls in autumn and are smaller than the first, which appear early in June. The alternate host is the pear, where they live on the roots and the trunks close to the ground as apterae. Passerini's *Schizoneura venusta* was supposed by Lichtenstein to be the underground form of this insect. According to Buckton, "Bonnet noticed these galls, more than a hundred years ago and says that in his time they were used in Persia, China and the Levant under the name of 'baizonges,' to assist in extracting the scarlet dye from the cochineal insects." Passerini says with reference to the liquid from these galls: "Rustici nostri liguore gummoso-saccharino in gallis collecto ut untur ad curandum vulneribus sub nomine olei St. Joannis."

Mr. Rymer Roberts and myself have found fundatrigenia on Hornbeams in Westmorland and at Hothfield in Kent ; but they were apparently vagrants. I have only once seen it on the roots of pears and then many years ago at Kingston-on-Thames. It seems to be uncommon in this country.

ERIOSOMA ULMI Linnæus.

Aphis ulmi Linnæus.

Aphis foliorum De Geer.

Chermes ulmi Burmeister.

Eriosoma ulmi Mosley.

Cinara gallarum ulmi Ruricola.

Schizoneura ulmi Kaltenbach.

Schizoneura fodiens Buckton.

Schizoneura grossulariæ Taschenberg.

Eriosoma japonicum Matsumura.

Linnæus, Syst. Nat., II., 733, 2, et Ed. X., 451 (1758) ; De Geer, Ins., III., 82, pl. V., figs. 7-22 (1773) ; Reaumur, Ins., III., 281, 350, pl. 25, figs. 4-7 (1737) ; Fabricius, Sp. Ins., II., 733, 2 (1781) ; Ent. Syst., IV., 217, 36 (1793) ; Syst. Rhyng., 299, 37 (1822) ; Mant. Ins., 316, 37 (1787) ; Bonnet, Hist. Nat., I., 8, pl. I., fig. 3 (1779) ; Rossi, Fn. Etrusca, 263, 391 (1805) ; Boyer, Ann. Soc. Ent., Fr., X., 190, 33 (1841) ; Schrank, Fn. Boic., II., 109 (1801) ; Burmeister, Hndbk. Entomo., II., 91, 3 (1836) ; Mosley, Gard. Chron., I., 828 (1840) ; Ruricola, Gard. Chron., IV., 37 (1843) ; Kaltenbach, Mono. Pflanz., 173 (1843) ; Walker, List. Homop. (B.M.), IV., 1049, 5 (1852) ; Koch, Die Pflanz., 262, figs. 337-338 (1857) ; Passerini, Aphid. Italicæ., 70 (1863) ; Courchet, Mém. d. l'acad. Montpellier, 99 (1879) ; Kessler, Ber. d. Ver. f. Naturkunde zn. Cassel, XXVI. and XXVII., 81, pl. II., figs. 17-21 (1880) ; Buckton, Mono. Brit. Aphid., III., 97, pl. CVIII. and CIX., figs. 1-4 (*ulmi*) and 94, pl. CVI., figs. 6-12 (1881) ; Taschenberg, Vert. blatt. Deutsch. Pomol. Ver., 80 (1887) ; Cholodkovsky, Zool. Anz. n. 520, 508-513 (1896) ; Del Guercio, Prospetto dell afidofauna italica. Nuove relaz., Se. 1, 2, 104 (1900) ; Schouteden, Ann. Soc. Ent. Belg., XLVII., 189 (1903) ; Tullgren, Arkiv. f. Zool., 14, 163-159, figs. 78-82 (1909) ; Gillette, Journ. Eco. Ent., II., 356 (1909) ; Theobald, Journ. Eco. Biol., VII., 3, 111-115, fig. 13, pl. III., figs. 4-6 (1912) ; Baker, Rept. 101, U.S.A. Dept. Agri., 14, pl. III. A (1915).

Alate viviparous female (ulmi). Head and thorax black; abdomen dark brownish black; white woolly matter on abdomen, especially arising from the apex. Eyes black. Antennæ and legs black. Wing membrane smoky; veins dark, almost black, some deep brownish, also stigma. Antennæ less than one-third length of body; segments i. larger than ii., globular, constricted at base; iii. very long with 32-40 annular sensoria (some not complete); iv. small, with 5-9 sensoria; longer than v.; v. and vi. about equal in length; only primary sensoria on v. and vi. fringed with hairs; the number of sensorial rings on iii. much greater than in the *Ribes*-root form and the apical segment is proportionately longer.

Length 2 to 2.3 mm.

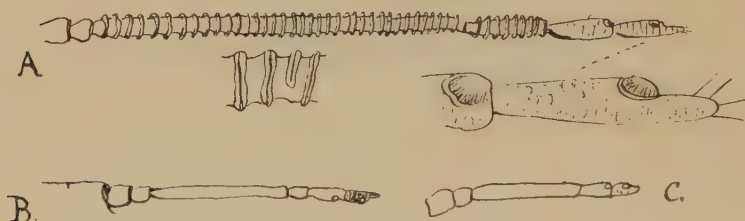


Fig. 170.—*Eriosoma ulmi* Linnæus.

A. Antenna of Fundatrigenia; B. of apterous ♀; C. of Stem mother.

Apterous female. Bright green to pale green or dull greenish-brown, in some more or less mottled; 4 lines of wax plates down the dorsum and lateral ones, from which white flocculent matter is passed out. Head, thorax and antennæ brown to dark brown. Legs very short and dark brown. Antennæ very short of 5 segments in stem mother, 6 in later stages; i. larger than ii.;



Fig. 171.

Eriosoma ulmi Linn.

Head of alate ♀.

iii. long, longer than iv. + v. + vi. ; iv. and vi. nearly equal in length. Long hairs on legs. Rostrum reaches to second coxæ. More or less globular at first.

Length 2.6 to 2.9 mm.

Alate viviparous female (fodiens). Head and thorax black ; abdomen slaty-grey to pale brownish grey. Antennæ and legs black. Rostrum dark. Wings fuscous, base and stigma ochreous. Antennæ shorter than body ; segment i. larger than ii. ; iii. very long, longer than iv. + v. + vi., with 21-22 annular sensoria ; iv. a little longer than v. with 4 sensoria ; v. and vi. with large primary sensoria ; vi. a little longer than v., relatively shorter than in the Elm form.

Length 1.7 to 1.9 mm.

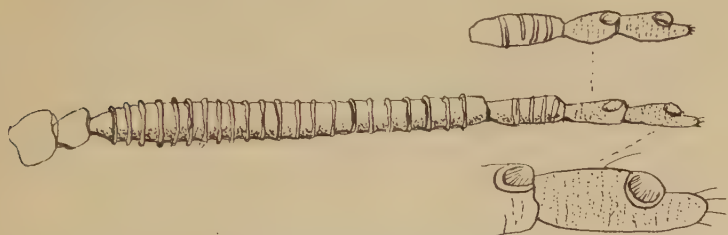


Fig. 172.—*Eriosoma ulmi* Linnæus.
Antenna of sexupara from Ribes roots.

Apterous viviparous female. Globose to elongated oval, rather shiny, pale ochre to dull reddish yellow, mealy ; head darkened. Antennæ and legs smoky. A series of dark spots each side of body, but not always showing. Antennæ shorter than head and thorax, of 5 or 6 segments. Eyes small, dark. Rostrum pallid, apex dark, reaching beyond third coxæ.

Length 1.2 to 1.4 mm.

Nymph. Much the same colour as apterous female, but more elongate ; wing pads brownish ; thoracic lobes reddish-yellow to slaty-grey. Antennæ short and thick ; segment iii. showing traces of internal annulation.

Length 1.4 to 1.6 mm.

Male. Very small. Apterous. Arostrate. Antennæ very small, of 5 segments ; i. wider but no longer than ii. ; iii. about

equal to v. ; vi. smaller than either ; a sensorium on iii. and a few scattered hairs.

Length 0.53 mm.

Oviparous female. Apterous. Arostrate. Antennæ very short, of 3 segments ; i. larger than ii. ; iii. very long, with 2 partial constrictions, representing segments iv. and v., in some quite marked off ; a few scattered hairs and normal primary sensoria.

Length 0.87 mm.

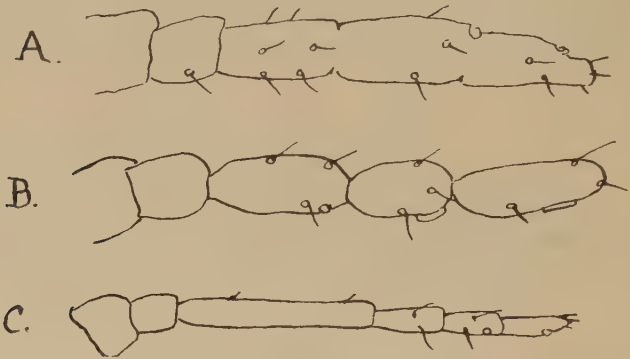


Fig. 173.—*Eriosoma ulmi* Linn.

A. Antenna of oviparous ♀ ; B. of ♂ and C. of apterous ♀. (A. and B. after Tullgren.)

FOOD PLANTS. Elms (*Ulmus campestris* ; *U. montana*) ; Ribes (*Ribes rubrum* ; *R. nigrum* ; *R. grossulariæ*) ; Mulberry.

LOCALITIES. The Elm form (*ulmi*) seems to be found almost everywhere in Great Britain where Elms occur ; the root form is not so often seen, it has been found in the following places : Paddock Wood, Wye, Maidstone, Swanley, Faversham, Sevenoaks and Tenterden in Kent ; Farnham, Woking, Kingston-on-Thames in Surrey ; Hailsham ; Hastings ; Little Hadham ; St. Neots ; Great Staughton ; Chagford ; Cambridge, and in Norfolk and Suffolk (F.V.T.) ; Haslemere (Buckton) ; Wisley ; E. Malling ; Cadnam, Hants. ; Lynton ; Torquay ; Norwich ; Cambridge ; Birmingham ; Dolgelly, etc. (Laing) ; Morningside, Edinburgh, 1 vii. 22 (Evans) ; Ireland (Carpenter) ; Penmenmawr, N. Wales, vi. 28 (Barnes) ; Belgium (Schouteden) ; Germany (Koch, etc.) ; America (Patch, etc.).

Observations. Like *Eriosoma lanigerum* and *E. lanuginosum*, this species migrates from the Elms to another group of plants. In this case the migration takes place to various species of *Ribes*, notably Black and Red Currants (*Ribes nigrum* and *R. rubrum*), and to the Gooseberry (*R. grossulariæ*). On the elms this aphid causes the leaves to curl up in very characteristic manner (vide Fig. 174). Single leaves here and there are rolled up at their edges and the distorted part becomes more or less swollen and paler in colour, now and then a reddish hue is produced. Under this curled leaf we find the apteræ amongst a lot of meal, flocculent matter and mealy coated oil globules of a saccharine nature. There the apteræ grow into nymphæ and in July (and a few as late as August) become the alate migrants. These fly away erratically and many get blown by the wind a great distance, losing their flocculent matter. Those that happen to alight on Currants and Gooseberries or on the soil near them drop their young, which move into the soil and when coming in contact with the roots and fibres of the fruit bushes set to work to feed upon them. I have watched the alate females penetrate into the soil to deposit their



Fig. 174.

Elm Leaves (*Ulmus campestris*) curled by *Eriosoma ulmi* Linnæus.

young. These larvæ grow into the apterous females which live on the *Ribes* roots until November and even up to mid-December when they become nymphæ and soon emerge as alate females (return migrants) which come out of the soil and fly back to the Elms. On the Elms they produce apterous males and females and the latter on being fertilised deposit a single egg in crevices in the bark according to some observers on the boughs and twigs and there the few black ova remain all the winter and in the spring they hatch and the larvæ produce the "Mother Queens" which are viviparous and give rise to the many apterous females we find in the curled leaves and thus the life-cycle is completed. The ova are at first yellow and then become black and are covered with down and over or by the side of each is left the skin of the mother. I have found these ova on the twigs and buds, but never as described in crevices in the bark. The damage done to the Elms is of no account, but the root forms on the *Ribes*, especially when on nursery stock may do a great deal of harm, for the aphides not only feed on the rootlets, but congregate on the larger roots and cause them to split. Frequent complaints have been made to me of the loss caused by this insect by fruit-growers. Buckton's *Schizoneura fodiens* and Taschenberg's *S. grossulariæ* both fall as synonyms of the *ulmi* of Linnæus. It appears especially to be a pest on the roots of gooseberries and currants in Norfolk and parts of Suffolk and seems to be increasing there. In one case reported to me, 30,000 cuttings had become infested near Norwich. It has also now and then done harm to young gooseberries in Kent. In June, 1928, Mr. H. F. Barnes sent me galled Mulberry leaves from North Wales, curled in exactly the same way as on the Elm—apteræ, nymphæ and alatæ occurred in masses in each curled leaf, typical *Eriosoma ulmi*.

ERIOSOMA ULMOSEDENS Marchal.

Eriosoma phœnax Mordwilko.

Marchal, Comp. Rend. d. Sc. d'l Acad. d. Sciences, 169, No. 5, 211-216 (1919); No. 2, 271-275 (1924); Revue d'Patholo. vegetale et Ent. Agri., II. S., 46-55 (1924); Mordwilko, Compt. Rend. d. Acad. d. Sci. Russe, 40, 42 (1923).

Alate viviparous female. Head and thorax dark; abdomen paler, dull green to deep greenish-brown; antennæ dark; legs

dark, except tibiæ, which in some are paler. In cleared specimens the abdomen shows 6 narrow dark transverse bars. Antennæ about as long as head and thorax; segments i. and ii. about equal; iii. longer than iv., v. and vi.; iii. with 24-25 irregular thin sensorial rings, some only partial; iv. with 4-5; v. with 2-5 partial ones; vi. with none; v. longer than iv.; vi. much shorter than iv. Rostrum reaching to or past second coxæ. Anal plate and cauda dark and precaudal plate. Cornicles slightly raised, round, dark. Body with irregular bands of short hairs. Wings with smoky stigma and veins. The cornicles have a few hairs on the base.

Length 2.2 to 2.5 mm.

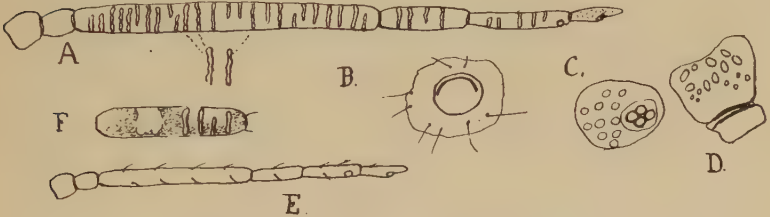


Fig. 175.—*Eriosoma ulmosedens* Marchal.

A. Antenna of viviparous alate ♀; B. Cornicle; C. Eye; D. Fore coxa and trochanter; E. Antenna of apterous viviparous ♀; F. Variety of IV of *E. ulmi*.

Apterous viviparous female. Pale green and yellowish-green of varied shades, with much white meal and wool; head dusky or dark green; legs and antennæ dusky. Antennæ less than half the length of the body; segments i. and ii. equal; iii. long, as long as iv.+v.; iv. a little shorter than v., equal to vi.; hairy. Eyes round, small with about 15 facets in two groups. Rostrum to or just past second coxæ, acuminate, last segment long. Legs moderate, rather thick, hairy; coxæ with glands, also femora. Cauda dark. Cornicles pale, slightly raised, a few hairs on the base.

Length 2.5 mm.

Stem Mother. Pale green or greenish yellow, mottled with deeper colour; head dusky or dark green. Antennæ same colour as the body, base and apex dusky. Anal plate and base and apex of rostrum dusky. Legs dark. Covered with white or bluish-white woolly excretion, especially apically, the last few segments

often with long flocculent tufts. Antennæ of 5 segments; ii. slightly longer than i.; iii. the longest; iv. smaller than iii., about as long as v.; primary sensoria on iv. and v. Eyes of 3 facets, black. Rostrum reaches to second coxæ, sometimes just beyond. Legs somewhat short. Cauda and anal plate rounded, with many prominent hairs. Cornicles as simple pores, sometimes very slightly elevated. It gradually becomes globular.

Length 2.0 to 2.1 mm.

FOOD PLANTS. Elms (*Ulmus montana* and *U. campestris*).

LOCALITIES. Generally distributed and common.

Observations. This insect lives mainly on the suckers of the Elms and causes the leaves to curl up. In the curled leaves the apteræ produce much honey dew and oily globules. Alatæ appear in July, but we do not know where they fly to or anything of its life cycle. It is much preyed upon by Syrphid larvæ, especially *Catabomba pyrastris* and *Syrphus ribesii* and *S. grossulariæ*. Often these predaceous larvæ clear out whole colonies. It seems to occur all over Europe. Mordwilko described it from Russia as *Eriosoma phœnax*.

Genus **TETRANEURA** Hartig (Kaltenbach).

Pemphigus Passerini (part).

Hartig, Germar's Zeitschr. f. Ent., III., 366 (1841); Kaltenbach, Mono. Pflanz., 189 (1843); Koch, Die Pflanz., 287 (1857); Passerini, Aphid. Ital., 70 (*Pemphigus*, part) and 77 (*Tetraneura*) (1863); Buckton, Mono. Brit. Aphid., III., 113 and 131 (*Tetraneura*) (1881); Del Guercio, Pros. dell' afidofauna italica, 91 (1900); Mordwilko, Ann. Mus. Zool. Imp. d. l'Acad. d. Sc. d. Petrograd, XIII., 367 (1908); Tullgren, Arkiv. f. Zool., V., 14, 171 (1909); Baker, Bull. 826, U.S.A. Dept. Agri., 68, pl. X., H-M (1920); Tullgren, Medd. No. 280, f. Central. f. försök. p. jordbrück. Entomo. avdel., No. 44, 37 (1925).

Cornicles on slightly elevated areas, more or less prominent. Stem mother with antennæ of 4 segments; other apterous viviparæ have 5 segments. Antennæ of alate female of 6 segments, with annular sensoria, which nearly encircle the segments. Front wings with media simple; hind pair with media only. *Apteræ with only one tarsal segment.* Sexuales very small, apterous, arostrate. Some members of this genus live in prominent galls on

Elm leaves, and the migrants give rise to young which feed on the roots of grasses, etc. Most are only known in the apterous subterranean stage. Others in which alatae occur have not yet been traced to any gall forming stage. The oviparous female lays only a single egg. Two species occur in Great Britain, *T. ulmifoliae* and *T. rosea* Koch. Haliday's *Bryocrypta pallida* is a *Gobaishia*, not a *Tetraneura*. Koch's *rosea* undoubtedly comes here.

TETRANEURA ULMIFOLIÆ Baker.

- Aphis ulmi* Linnæus.
- Aphis gallarum-ulmi* De Geer, etc.
- Aphis* (*Tetraneura*) *ulmi* Ratzeburg.
- Bryocrypta ulmi-gallarum* Haliday.
- Tetraneura ulmi* Hartig.
- Pemphigus cærulescens* Mordwilko.
- Bryocrypta graminis* Schouteden.
- Tetraneura ulmisacculi* Patch.
- Tetraneura yezoensis* Matsumura.
- Tetraneura javensis* V. d. Goot.

Linnæus, Syst. Nat. Ed., X., 451 (1758) ; De Geer, Hist. d. Ins., III., 89, 14, Pl. IV., figs. 15-17 (1773) ; Von Gleichen, Vers. Gesch. Blattl. Ulm., I., 21 (1770) ; Bonnet, Hist. Nat., I., 8, Pl. 1, fig. 3 (1779) ; Schrank, Fn. Boica, II., 109 (1801) ; Burmeister, Handb. d. Ent., 91 (1836) ; Haliday, Ann. Nat. Hist., II., 1839, 189 (1839) ; Hartig., Germar. Ent. Zeit., III., 366 (1841) ; Amyot, Ann. Soc. Ent. Fr., Se. 2, 484, 536 (1843) ; Kaltenbach, Mono. Pflanz., 189, figs. 10-12 (1843) ; Ratzeburg, Forst. Ins., III., 222, Pl. 13, fig. 2 (1844) ; Walker, List. Homop., IV., 1059, 1 (1852) ; Koch, Die Pflanzenlaus, 288, figs. 358, 359 (1857) ; Passerini, Aphid-Ital., 74 and 78 (1863) ; Ferrari, Aphid. Liguriæ, 83 (1872) ; Buckton, Mono. Brit. Aphid., III., 131, Pl. CXIV., figs. 5-13 (1880) ; Kessler, Ber. d. Ver. f. Naturkunde, z. Cassel, XXVI. and XXVII., 58 (1880) ; Horvath, Rovart. Lapok, II., 153-160 (1885) ; Mordwilko, Zur. Biol. u. Morph. d. Pflanz., 304 (1896) ; Cholodkovsky, Zool. Anz., 509 (1896) ; Cholodkovsky, Aphid. Mitteil., II., Zool. Anz., 474, (1899) ; Del Guercio, Nuov. relaz., Se. I., 93 (1900) ; Mordwilko, Z. Biol. u. Morph. d. Pflanz., 60, figs. 20-21 (1901) ; Schouteden, Mém. Soc. Ent. Belg., XII., 190 (1906) ; Mordwilko, Biol. Central-blatt, XXVII., 781 (1907) ;

and XXIX., 150-158 (1909) ; Tullgren, Ark. v. f. Zoologi., V., n. 14, 171-182 (1909) ; Patch, Maine Agri. Exp. Sta. Bull. 181, 216 (1910) ; Donisthorpe, Ent. Rec. 268 (1913) ; Matsumura ; Synopsis Pemphigidae Japan, 73, Pl. X., fig. 3a and Pl. XIII., fig. 8 (1917) ; Baker, Bull. 826, 68, U.S.A. Dep. Agric. (1920) ; Schouteden, Mém. Soc. Ent. Belg., XII., 198 (1906) = *graminis* ; Tullgren, Medd., 280, f. Central. f. försök. f. fd. jordbrutt. Entomo. avdeln., No. 44, 37 (1925).

Alate viviparous female (Fundatrigenia). From Elm Gall. Head and thorax black. Abdomen green. Cauda dusky. Spiracles with well marked borders. Nectaries flat, marked by dark rings. Antennæ brown, much shorter than head and thorax ; segment i. shorter than ii. ; iii. rather long, longer than v. ; iv. small, about as long as vi. ; v. a little shorter than iii. ; vi. rather small, " nail " very short and blunt ; iii. with 14-15 whole and partial annular sensoria on one side ; iv. with 2 to 3 ; v. with 8 to 9. Eyes large, black. Legs dark brown ; bases of femora pallid. All segments hairy. Tarsi of 2 segments, basal segment very small. Stigma brown, more dusky on inner border ; sides of veins slightly smoky.

Length 1.4 to 2.5 mm.

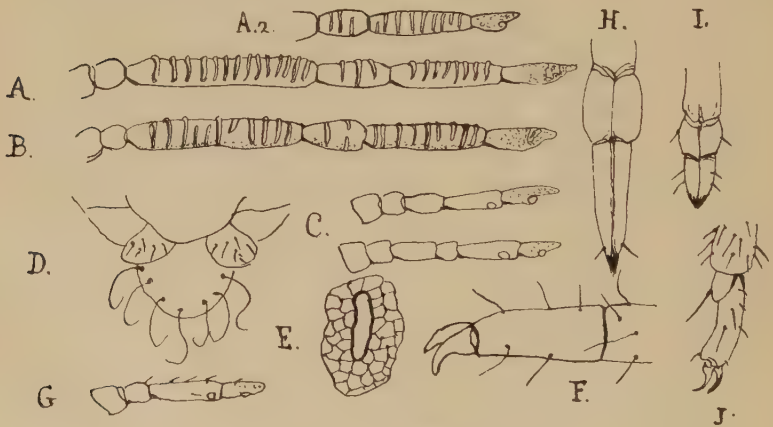


Fig. 176.—*Tetraneura ulmifoliae* Baker.

A. and A₂. Antenna of Fundatrigenia ; B. of Sexupara ; C. of virgogenia ; D. Cauda and anal lobes ; E. Wax plate ; F. Tarsus of apteræ ; G. Antenna of Fundatrix ; H. Apex of rostrum of Sexupara ; I. of fundatrix ; J. Tarsus of apterous ♀.

Apterous viviparous female (Fundatrix). In Elm galls. Globular. Green to dark green, grey or brown. Eyes small, black. Antennæ very short, of 4 segments, 2 basal ones largest, but very short, broader than long; iii. longest, with a few hairs; iv. small and blunt, about one-third of iii.; "nail" very short and blunt. Body with few hairs. Head, legs, pronotum, and antennæ dusky. Legs short and thick, *one tarsal segment only*, closely attached to tibia, a few hairs and two blunt ungues. Rostrum rather blunt, last 2 segments nearly equal in length, the last with a few, short, stiff hairs.

Length 1.8 to 2 mm.



Fig. 177.
Tetraneura ulmifoliae Baker.
Alate ♀ head.

Nymph. Various shades of green; legs and antennæ dusky. Eyes large, black, tinged with red. Antennæ of 6 segments; i., ii. and iv. small, of about equal size; iii. longest; v. not quite so long as iii., but longer than vi. Wing cases pale or tinged with brown. Legs rather short and thick; tarsi of one segment. A few hairs on legs, antennæ and sides of body. Cauda with 4 chaetæ.

Alate viviparous female (Sexuparæ). From the soil. Return migrant. Head and thorax black, naked and shiny. Abdomen oval or rounded, green. Very like former alate female, except the antennæ. Segments i. and ii. broader than long, with a few hairs; iii. with 10 to 12 annular sensoria on one side, rather irregular in disposition, as long as v. to a little longer; iv. small, with 2 to 4 rings; v. long, with 9 to 13, some irregular; vi. small, but a little longer than iv., finely spinose, with a few short apical hairs and a few on the other segments. Rostrum to or just beyond second coxæ, last segment about twice as long as the

penultimate, with two apical hairs and four on the broader penultimate one. Tarsi of 2 segments; basal one small, with a large spine. Legs hairy or spinose.

Length 1.9 to 2.2 mm.

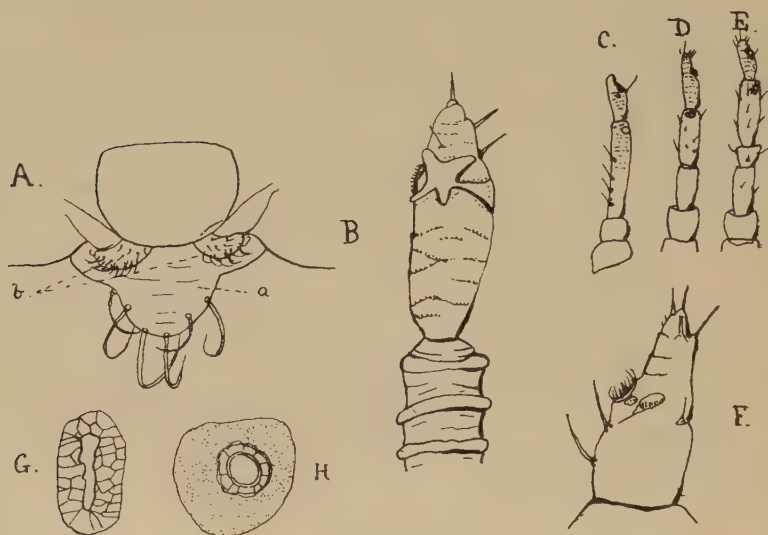


Fig. 178.—*Tetraneura ulmifoliae* Baker.

A. Apex (venter) of abdomen (a), cauda (b), anal plate; B. Apex of antenna (Fundatrigenia); C. Antenna of fundatrix; D. of virgogenia; E. of hibernating virgogenia; F. Apical antennal segment; G. H. Wax plates (after Tullgren).

Apterous viviparous female (Virgogenia). In the soil and in ants' nests. Head broad and nearly flat to slightly rounded, narrowed in front. Body swelling out behind. Eyes small, black, not prominent, of three facets. Antennæ short and moderately thick. Dull yellowish-red to reddish-brown, a greenish-brown with deeper markings or all brown. Antennæ of 5 segments, but in the so-called "hibernierenden virgogenia" of 6 segments; in the former segment i. is larger than ii.; iii. shorter than iv.; iv. longer than v.; v. about as long as iii.; "nail" on vi. small; apices of antennæ darkened. Rostrum rather short, moderately thick, reaching to third coxæ; apical segment longer and slightly narrower than penultimate, with two long apical hairs and a few shorter ones on the surface. Legs rather thick and pale; tarsi of one segment; a few short scattered

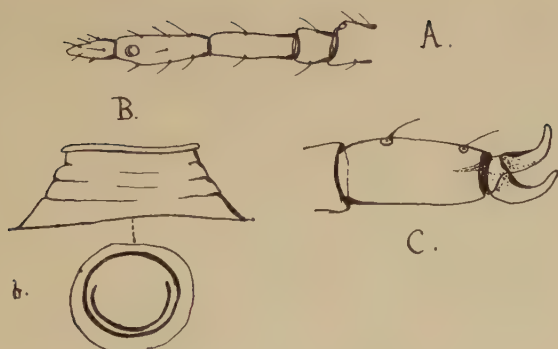


Fig. 179.—*Tetaneura ulmifoliae* Baker.
Apterous ♀ in soil. A. Antenna; B. Cornicles, b. dorsal view; C. Tarsus.

hairs on legs, one row on tibiae. Body with a few scattered hairs. Cauda prominent, rounded, with rather long hairs, markedly curved at apices, usually six in number. Anal plate apparently of two lobes.

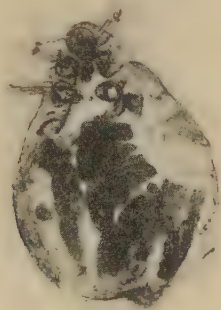


Fig. 180.
Tetaneura ulmifoliae Baker.
Apterous viviparous ♀.

Length 1.5 to 2 mm.

Nymph. In soil very similar to former, but with pale wing-pads and a marked blunt triangular process each side of cauda.

Length 1.5 to 1.8 mm.

Larva in soil with antennæ of 5 segments ; i. wider and shorter than ii. ; iii. very small ; iv. nearly as long as the three preceeding ones ; v. small and dark.

Length .8 to 1.0 mm.

These larva are pale forms derived from the subterranean apterous females and exist in all stages with the mature females. Some of the mature apterous females I have found are pearly white or kid-glove colour, with brown head, antennæ and legs. One specimen sent me by Mr. H. Donisthorpe taken in an ants' nest at Hull in October, when quite fresh, showed brown longitudinal lines running from the head to the cauda and was full of young.

FOOD PLANTS. Elms (*Ulmus campestris* ; *U. montana* ; *U. suberosa*) ; *Cratægus spp.* (Ferrari) ; on roots of many *Gramineæ*, including wheat and barley (Theobald, Schouteden, etc.) ; *Saccarum officinarum* roots (Van der Goot and Takahashi) ; *Colocasia antiquorum* (Takahashi).

LOCALITIES. Cambridge, vi. 89 ; Kingston-on-Thames, vi. 84 ; Wye ; Alexandra Park, Hastings ; Widdington, Essex, vii., 95 ; Bearsted, Kent, vi., 08 ; Brondesbury, N.W. London, vi. 01 ; Chepstow, vii. 07 ; Hereford, vi. 07 ; Clevedon, Somerset, vi. 05 ; Wells, vi. 05 ; Okehampton, vii. 04 ; Fowey, viii. 05 ; Oxford, vi. 04 ; Worcester, vii. 08 ; Godalming and Guildford, vi. 11 ; Bournemouth, vi. 14 ; Isle of Wight, vi. 14 ; York, vii. 01 (Theobald) ; Ore, near Hastings (Bloomfield) ; Old Romney (Buckton) ; Lundy Island, 1913, with *Lasius flavus*, 9 vi. ; Bradgate Park, Leicester, 3 v. 09, with *L. flavus* and *L. fuscus* and *M. scabrinodis* ; Darenth Wood, Kent, 6 vi. 09 with *L. flavus* ; Whitsand Bay, Cornwall, iv. 09 with *L. alienus* ; St. Issey, Cornwall, 25 iv. 11 with *T. caespitum* ; Isle of Eigg, Hebrides, 17 ix 11 with *L. flavus* ; Loch Aber, near Dumfries, 3 iv. 08 with *M. ruginodis* (Donisthorpe) ; Porlock, Somerset, with *L. flavus* (Crawley) ; Hull, with ants, 12 x. 15 ; Great Salkeld (Britten) ; Wan Fell, Cumberland, 30 x. 12 in ants' nests, nymphæ and alatæ (Britten) ; Taormina, Sicily, 18 iv. 26 with *Camponotus* and *Tetramorium* (Donisthorpe) ; Belgium (Schouteden and Donisthorpe) ; Cassel, Germany (Buckton) ; Germany (Kaltenbach, Koch) ; Stazzano, Italy (Ferrari) ; Russia (Mordwilko) ; Stockholm, with *L. niger* (Tullgren) ; America (Patch) ;

Altai Mountains (Verestshagin); Japan (Matsumura and Takahashi); Formosa (Takahashi); Java (V. d. Goot); Sumatra (Takahashi).

ANTS NESTS, FOUND IN. *Lasius niger*; *L. flavus*; *Formica fusca*; *Myrmica ruginodis*; *M. scabrinodis*; *Camponotus* and *Tetramorium caespitum*.

Observations. Best known in its gall stage on the Elms. These bladder-like galls contain the Mother Queen and young. The young packed close together; the galls also contain a mealy substance, and numerous oil globules. The galls may occur singly or in groups on the leaves. These galls have been produced by the young of the sexual insects hatched from ova laid on the Elm trees. I have found the Fundatrix from May onwards to July, some occurring at the same time with nymphæ and alate migrants. The latter do not all seem to escape at once from the



Fig. 181.
A group of galls of *Tetraneura ulmifoliæ* Baker.
(Slightly enlarged.)

galls, which split open to allow their exit. The alate females or fundatrigenia I have found as early as the end of June and through July and even on into August, but most in June and July. The alatae on leaving the galls fly to the ground and deposit their young, which feed upon various roots of plants, these become the virgogenia, one form having antennæ of five segments, whilst the other has them of six segments. This stage I have found in the soil in winter and on to June, also in August and on to the next spring. They are very abundant also in ants' nests, from which I have received them in April, May, June, August, September and October. Found alongside with the 5 segmented antennal forms are often those with 6 segments—the hibernierenden virgogenia—of Tullgren. In late autumn many of the soil apteræ give rise to nymphæ and these assume wings and become alate sexuparæ. These fly from the soil and back to the Elms, where they produce the sexuales which lay their eggs on the Elm trees. These males and oviparous females I have never found. They are apparently small and apterous. Buckton describes the spring female as "occurring early, very minute, longish, black, shiny, and apterous," and states that they are found close to the leaf buds of the Elm. They are about 0.010 mm. long. These become the "Queens" of the colonies which are to appear through the year. As soon as the young leaves occur these insects commence their irritating action and the leaves show by the red spots on their under sides that there is a diversion of sap, causing a cupping of the edges of the rising blisters, which finally arch over and enclose the growing aphid and so the marked galls are gradually formed. The ground forms appear to me to last over two seasons, so that we get an overlapping of broods.

Mordwilko describes this species as *Pemphigus (Tetraneura) cærulescens* of Passerini. He found them at the roots of oats and *Lolium perenne*. The apterous virgogenia seem to be very common in ants' nests. I at first thought that the form of apteræ with antennæ of 5 segments must be different to the less frequently found form with 6 segments and which I definitely traced to *T. ulmifoliæ*. Specimens were sent to Dr. Mordwilko who kindly wrote me that they were undoubtedly only *ulmifoliæ*. Since then Tullgren's paper places this beyond doubt and it appears from the great number sent me by Mr. Donisthorpe and from many taken in the soil and ants' nests by myself in Kent that the

virgogenia is the most common form especially in formicaries. Alatae may be found in ants' nests from September to October.

Buckton describes the oviparous female as follows :—" Very small, globular. Antennæ only partially developed and composed of four joints. Rostrum none. Eyes minute, showing but seven to eight facets. Legs short. Abdomen composed almost exclusively of one large egg." Vide also Mordwilko (fig. 14, p. 307).

Tullgren (v. 14) found the galls the size of a hazel nut by mid June in Sweden. On July 24th—alatae—the galls opening in July, these flew to grass and produced young, especially to couch—in August colonies are found in the ground in *L. niger* nests mostly in grass hillocks (*Triticum*). In mid September sexuparae were developed, flew away and far, because no Elm galls occurred near.

It appears this insect can live entirely on the roots of *Gramineæ*. It occurs in Java on the roots of *Saccharum officinarum*, where there are no Elms. The presence of exules of *Tetraneura* in Java can be explained according to Mordwilko by the presence of Elms which penetrated together with the *Tetraneura* during the glacial times into Java, and that when later the Elms disappeared the *Tetraneura* survived as colonici on the roots of *Gramineæ*, etc.

The same applies to its occurrence in the Altai mountains where no elms occur.

Mordwilko considers Dufour's *Zea-maidis** as this insect. If so Dufour's name takes precedence. He also considers Koch's *Amycla fuscifrons* to be the same. The posterior wing venation differs. Boyer's *Aphis radicum*† has also been placed as a synonym. It might be a *Forda*.

TETRANEURA ROSEA Koch.

Endeis rosea Koch.

Dryopeia rosea Kirkaldy.

Koch, Die Pflanzenlause, 313, fig. 383 (1857); Schouteden, Mém. Soc. Ent. Belg., XII., 193 (1906); Wilson and Vickery, List Aphididæ of the World, 147.

* Dufour, Ann. d. Sci. Nat. II, 203 (1824); Dufour describes the insect as a *Coccus* and so I have much hesitation in placing it as this *Tetraneura*.

† Ann. d. Sci. France, X, 195 (1841).

Apterous viviparous female. Globular. Pale to deep reddish ; head and thorax dark ; rather dark at apex ; shiny, with white meal ; legs and antennæ yellow ; eyes black ; rostrum red, apex dark. Antennæ very short, of 5 segments ; i. wider than ii. ; iii. a little longer and narrower than ii. ; iv. the longest, about as long as ii. + iii. ; v. very short, with short, blunt nail, about as long as ii. ; ii. to iv. each with a single large round sensorium, near apices of the segments ; v. with one at base of the "nail." Rostrum short and thick, reaching to or nearly to the third coxæ. Legs very short and thick ; the posterior pair not projecting from

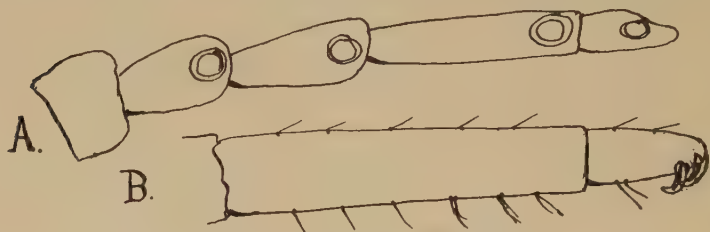


Fig. 182.—*Tetraneura rosea* Koch.

A. Antenna of apterous viviparous ♀ ; B. Tibia and tarsus.

the body when the insect is mature ; tarsi of one segment ; a few hairs on the tibiæ and tarsi ; ungues short, thick and much curved. Cornicles dusky, short and truncate. Cauda rounded, with three rather long hairs each side, markedly curved at their apices.

Length 2 to 2.7 mm.

FOOD PLANTS. Roots of grasses (Davidson) ; roots of *Atropis distans* (Schouteden) ; of many weeds (Wilson and Vickery).

LOCALITIES. Harpenden, 27 x. 21 (Davidson) ; Germany (Koch) ; Brussels (Schouteden).

Observations. Redescribed from two specimens taken by Captain James Davidson and presented to me with many other specimens from his collection. It is a very distinct species, easily demarked by its red colour and the sensoriation of the antennæ. Koch placed it in his genus *Endeis* and in the text called it *rorea* but in the index *rosea*, the first evidently a printer's error. In spite of the marked antennal sensoriation I place it in *Tetraneura*, owing to the typical tarsi, of one segment and the cauda. I have

never seen Koch's type species (*bella*) of *Endeis*, but his generic characters agree with *Tetraneura*. Kirkaldy renamed *Endeis*—*Dryopeia*. Koch found his specimens in April and May. The two specimens given me are too opaque to make out the detailed anatomy.

Genus TRUNCAPHIS Theobald.

Entomologist, LI, 25, fig. 1 (1918).

Body globular to oval. Segments marked. Cornicles apparently absent. Head more or less flattened in front. Antennæ very short and thick, of 4 segments; i., ii. and iii. nearly equal; iv. longest, with a small blunt "nail"; a round sensorium at base of "nail" and at apex of iii. Legs very stumpy and thick; tarsi of only one segment, as in *Tetraneura*; unguis bifid. Rostrum short. Cauda very small, rounded. Many dorsal wax glands.



Fig. 183.—*Truncaphis newsteadii* Theobald.

A. Head of Apterous viviparous ♀; B. and Cb. Cauda; C. Posterior segments showing glands; D. Apex of rostrum; D1. Fore leg.

Found on Mosses. Its antennæ of 4 segments, the absence of cornicles and the single tarsal segment, its short legs and sensoriation easily demark it.

TRUNCAPHIS NEWSTEADII Theobald.

Entomologist, LI, 25, fig. 1 (1918).

Apterous viviparous female. Pallid; legs and antennæ brown; in some much mealy matter exudes from the abdominal

glands on dorsum. Globular to oval in form; segments well defined. Antennæ very short, scarcely longer than femora; segment i. about same size as ii., both with a marked short lateral hair near apices; iii. about same length, narrowed basally, a large sensorium near apex; iv. the longest, about as long as ii. and iii., with very small, blunt "nail," with 3 short apical spines and a large round sensorium at base. Head more or less flattened, a single short hair on each side in front and showing a median sulcus. Eyes minute. Rostrum brown, thick, reaching to third coxæ; apical segment acuminate, narrower and slightly longer than penultimate. Legs thick and stumpy, slightly hirsute and projecting from body to a varied extent; tibiæ nearly as long, but slightly narrower than femora; tarsi composed of one thick, blunt segment; unguis double. Cauda small, rounded, with two small marked hairs; scarcely projecting. Dorsal apical segments of body with round glands in groups (fig. 183. B. - ?).

Length .9 to 1.2 mm.

FOOD PLANTS. Mosses (*Hypnum* spp.).

LOCALITIES. Great Witcombe, Gloucestershire, viii. 1902; Way's End, Camberley, Surrey, 6 vi. 17 (Newstead and Green).

Observations. A very marked Aphid twice found by Professor Newstead. The earlier specimens have not been taken as the type owing to their being in poor condition, but the marked stumpy legs and antennæ and the single blunt tarsal segment place them undoubtedly with the last found insects taken in moss at Camberley. So far this is the only species recorded feeding on Mosses. The very marked tarsal structure might place it in *Tetraneura*, but the very short, stumpy antennæ and the absence of cornicles demark it, hence I have placed it in a new genus near to *Tetraneura*. All the ground forms of *Tetraneura ulmifoliae* Baker showed marked 5 or 6 segmented antennæ and they and the legs are not nearly so short and stumpy as in the moss feeder and the cornicles are marked.

Genus GOBAISHIA Matsumura.

Brysocrypta Tullgren.

Matsumura, Synop. Pemphigidae of Japan, 75 (1917); Tullgren, Arkiv. F. Zool., V., 14, 182 (1909); Baker, Bull. 826, U.S. Dep. Agri., 67, Pl. X., A-G.; XI., V. (1920).

Cornicles present ; antennæ of stem mother of 4 segments ; alate female antennæ of 6 segments, with annular sensoria. Fore wings with media usually simple ; hind wings with media and cubitus. Type *Gobaishia japonica* Mats.

A single species occurs in Great Britain, namely *G. pallida* Haliday.

Gobaishia pallida Haliday.

Eriosoma pallida Haliday.

Aphis (*Tetraneura*) *alba* Ratzeburg.

Tetraneura alba Kessler.

Tetraneura alba Löw.

Pemphigus pallidus Buckton.

Tetraneura pallida Del Guercio.

Pemphigus alba Lichtenstein.

Tetraneura (*Brysocrypta*) *pallida* Tullgren.

Haliday, Ann. Mag. Nat. Hist., IV., 189 (1839) ; Ratzeburg, Die Forstinsekten, III., 222, Pl. XIII., 3 (1844) ; Kessler, Ver f. Natur. Cassel, XXVI.-XXVII., 78, Pl. II., figs. 1-17, 23 (1880) ; Löw, Verh. Zool. bot. Ver. Wien, XXIX., 65 (1880) ; Buckton, Mono. Brit. Aph., III., 127, Pl. CXIII., figs. 1-5 (1881) ; Del Guercio, Prosp. d. Afido-fauna Italica. Nuov. rel., Se. I., 2, 94 (1900) ; Tullgren, Arkiv. f. Zoologi., V., 14, 182, figs. 89-90 (1909).

Apterous viviparous female (Fundatrix). Oval. Yellowish, with some darker markings ; covered with white meal. Legs and antennæ brownish. Antennæ of 4 segments ; i. wider but about same length as ii. ; iii. the longest, about as long as the other three together, with a small sub-apical sensorium ; iv. short and narrower than iii., with very small " nail " (fringed) and a few apical spines and a fair sized fringed sensorium at base of " nail." Rostrum short. Cornicles wanting. Legs rather short and thick, hind pair longest.

Length 2 mm.

Alate viviparous female (Fundatrigenia). Head and thorax dark brown to black. Abdomen dark green, covered with a whitish meal. Antennæ and legs brown to black. Antennæ of 6 segments ; i. wider than ii. ; iii. longest, with 14 to 18 annulations, not encircling the segment ; iv. about one-third to one-fourth



Fig. 184.—*Gobaishia pallida* Haliday.

A. Antenna and B. Wings of alate viviparous ♀; C. Antenna of apterous ♀.

of iii. and as long as v., in a few much less, with 5-7 annular sensoria; v. with 5-7; vi. not quite so long as iv. + v., with very short, thick, blunt "nail," and 6 to 8 annular sensoria below the large and small sensoria at base of "nail"; a few apical spines. Rostrum reaches to or just beyond second coxæ. Legs somewhat long and narrow.

Length 2 to 2.5 mm.

LOCALITIES. Enfield, 17 vii. 15; Surbiton, 10 vii. 87; Wimbledon, 14 viii. 90 (F.V.T.); Newton Abbot and Cadnam, Hants. (Laing); Ostergotland, Ätridaberg, Sweden (Tullgren).

FOOD PLANTS. Elms (*Ulmus campestris* and *U. montana*).

Observations. This insect forms rather typical pallid green galls on the mid ribs of the leaves. Those I have found have all been single specimens, not several on a leaf as with *Tetraneura ulmifolia*, which galls they much resemble. It has been suggested that the *Rhizobius menthæ* of Passerini is the ground form of this insect, taken on the roots of *Mentha arvensis* (Lichtenstein). It has been placed in the genus *Brysocrypta* of Haliday which is now



Fig. 185.—Gall of *Gobaishia pallida* Haliday.

sunk under *Pemphigus*, the hind wing venation certainly differs from that of *Pemphigus*, but the other general characters agree. It has also been placed in *Tetraneura*, but in that genus the tarsi of the apteræ are of a single segment, not two segments. Recently it has been correctly placed in *Gobaishia*. Buckton figures the Queen aphid or "foundress" with the antennæ of five segments, the third having two sensoria in the middle.

II.

Sub-family HORMAPHIDINÆ.

The characters of this sub-family are given by Baker as follows :—

"Aerial forms living in galls or sometimes free upon the host. The mesothorax is in many forms altered so that its divisions are more or less unobservable, the entire mesothorax often shows as only one plate. Scale-like or aleyrodiform generations often developed. Cornicles often reduced to mere ring-like openings or entirely absent. Sexual forms small and apterous, but with fully developed beaks. Oviparous female laying several eggs."

There are three tribes in this sub-family, the *Hormaphidini*, *Oregmini*, and *Cerataphidini*.

They tabulate as follows :—

- | | |
|---|------------------------|
| 1. Aleyrodiform generations developed. | 2. |
| Aleyrodiform generations absent. | <i>Oregmini</i> . |
| 2. Cornicles absent ; insects usually gall formers. | |
| | <i>Hormaphidini</i> . |
| Cornicles usually present ; insects usually not gall formers. | |
| | <i>Cerataphidini</i> . |

The second and third are represented in Great Britain, the last only under glass.

This sub-family bears some close relationship to the *Eriosomatinae*, but their cauda and anal plate give them a *Callipterine* appearance, whilst the sexuales more nearly approach the *Aphidinae*. The sexuales being rostrate also places them away from the *Eriosomatinae*. The presence of aleyrodiform generations is the most marked feature in this sub-family. The wing venation to some extent agrees with the *Eriosomatinae*, but it varies ; for instance it is usual to have both the media and cubitus in the hind wings, but now and then the cubitus is absent.

Wax producing organs are much specialised. They are best placed in a separate sub-family.

Tribe CERATAPHIDINI.

Apterae scale-like and quiescent, with antennæ of three, four or five segments; the alatae of five segments; iii. to v. with annular sensoria. Distinct cornicles occur. Anal plate bilobed. Cauda rounded. Legs small or very small. Wax secretion abundant.

Three genera occur, which tabulate as follows:—

Antennæ of aleyrodiforms of 5 segments. *Aleurodaphis.*

Antennæ of aleyrodiforms of 4 segments. *Cerataphis.*

Antennæ of aleyrodiforms of 3 segments. *Thoracaphis.*

The genus *Cerataphis* is the only one recorded from Great Britain—the species *Cerataphis lataniae* Boisduval.

Genus CERATAPHIS Lichtenstein.

Boisduvalia Signoret.

Coccus Boisduval.

Asterolecanium Westwood.

Ceratovacuna Hempel.

Lichtenstein, Bull. Soc. Ent. Fr., Se. 6, II., XVI., Pl. LXXIV. (1882); Boisduval, Ent. Hort., 355, figs. 49 and 50 (1867)*; Signoret, Ann. Soc. Ent. Fr., Se. 4, VIII., 400, Pl. X., figs. 2 and 2a (1868); Signoret, Ann. Soc. Ent. Fr., X., Se. 4, Pl. 8, fig. 3 (1870); Signoret, Soc. Ent. Fr., II., Se. 5, 30 (1872); Westwood, Gard. Chron., XII., Se. 3, 796, fig. 131 (1879); Signoret, Bull. Soc. Ent. Fr., I., Se. 6, Pl. CLVII. (1881); Buckton, Mono. Brit. Aph., IV., 167, Pl. XXXIV. (1883); Sharp, Camb. Nat. Hist. Ins., II., 582 (1899); Pergande, Bull. 9, U.S. Dept. Agri. (1901); Embleton, Journ. Linn. Soc. Lond., XXIX., 90, Pl. 12 (1903); Van der Goot, Tijds. v. Ent., LV., 5, 319-332 and LVI., 181 (1913); Van der Goot, Hollandish Blattläuse, 433 (1915); Baker, Bull. 826, U.S. Dept. Agri., 87, Pl. XVI., F. to M. (1920).

This very marked genus is represented with us by one species, the *Coccus lataniae* of Boisduval. The quaint apterous form has antennæ of 4 segments; it is Scale-like, with two marked divisions

* In my copy of Boisduval, there are two pages 355, on one is *Coccus lataniae* on the other *Zeuzera aesculi*.

to the body. Cornicles as mere rings; not at all elevated. Wax glands prominent. Vertex with two well marked horn-like projections. Alate antennæ of 5 segments, with narrow annular sensoria. Cauda knobbed; anal plate bilobed. Fore wings with media once branched, hind with both media and cubitus developed. Lichtenstein's name has precedence over Signoret's as *Boisduvalia* was used for the Diptera in 1830.

CERATAPHIS LATANIÆ Boisduval.

Coccus lataniæ Boisduval.

Boisduvalia lataniæ Signoret.

Asterolecanium orchidearum Westwood.

Ceratovacuna brasillensis Hempel.

Cerataphis lataniæ Lichtenstein.

Boisduval, Ent. Horticole, 355, figs. 49, 50 (1867); Signoret, Ann. Soc. Ent. France, Se. 4, VIII., 400, Pl. X., figs. 2, 2a (1868), and Ann. Soc. Ent. Fr., Se. 4, X., Pl. 8, fig. 3 (1870); Signoret, Bull. Soc. Ent. Fr., Se. 5, II., 30 (1872); Westwood, Gard. Chron., Se. 3, XII., 796, fig. 131 (1879); Signoret, Bull. Soc. Ent. Fr., Ss. 6, I., CLVII., (1881); Lichtenstein, Bull. Soc. Ent. Fr.,

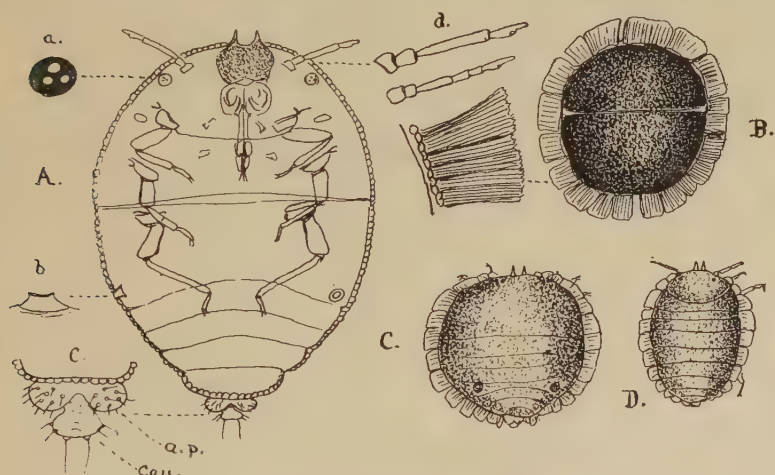


Fig. 186.—*Cerataphis lataniæ* Boisduval.

A. Apterous ♀, a. Eye, b. Cornicle, c. Cauda (cau) and anal plate (a.p.), d. antennæ; B. Coccus-like covering and wax plates; C. Immature ♀; D. Secondary larval stage.

Se. 6, II., LXXIV. (1882); Buckton, Mono. Brit. Aphid., IV., 197, Pl. CXXXIV. (1883); Hempel, Ann. Mag. Nat. Hist., Se. 7, VIII., 384 (1901); Pergande, Bull. 9, U.S. Dept. Agri. (Div. Ent.) (1901); Embleton, Journ. Linn. Soc. Lond., XXIX., 90, Pl. 12 (1903); Schouteden, Mem. d. l'Soc. Ent. Belg., XII., 197 (1906); Van der Goot, Holland. Blattläuse, 435 (1915).

Apterous viviparous female. Scale-like, with a thick layer of white wax-like plates around it. Colour varies from deep reddish- or purplish-brown to black; most are nearly circular, some oval. Body with a series of lateral glands, from which the white waxy plates are excreted. The wax plates are composed of thin strands giving a finely striated appearance. Legs and antennæ completely hidden when adult. Antennæ very short, composed of 4 segments (rarely 5 or 6); i. is wider but shorter than ii.; iii. the longest, about as long to a little longer than the other three; iv. small from half to less the length of iii. ending in a small "nail"; the antennæ reach to about first coxæ. Front of the head with two short, bluntly pointed spines or horns. Eyes very small, of 3 facets only, on a dark ground. Rostrum rather short and thick, reaches to second coxæ or a little before or beyond. Cauda more or less knob-shaped, to some extent flattened in some specimens at apex, and has two long hairs and four smaller ones which arise from prominent tubercles. Anal plate bilobed, with many short, stiff hairs. Cornicles slightly

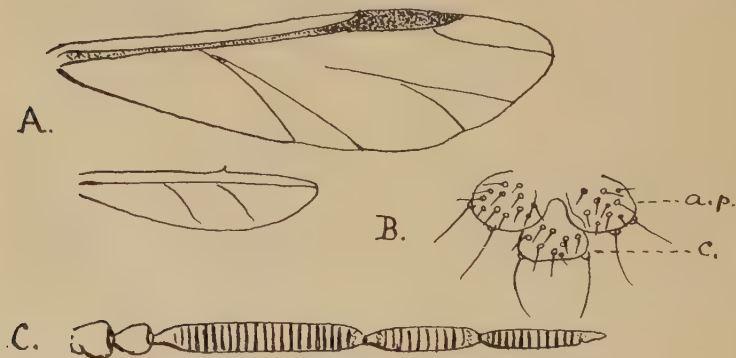


Fig. 187.—*Cerataphis lataniae* Boisduval.
Alate viviparous ♀; A. Wings; B. Cauda (c) and anal plate (a.p.); C. Antenna.

outstanding, on broad cones. Half way across the body is a furrow which separates head and thorax from the abdomen. Legs short and thick and do not appear over sides of body.

Length 1.5 to 1.8 mm.

Alate viviparous female. Head and thorax dark yellow to brown. Abdomen yellowish. Antennæ and legs dusky. Eyes large, dark; stemmata pronounced, median one outstanding. No horns on vertex as in apterous female. Antennæ of five segments; i. wider than ii.; iii. the longest, nearly as long as iv.+v., with 19 to 20 narrow sensoria; iv. not quite so long as v., wider, with 9 to 11 sensoria; v. with small nail and 9 to 11 sensoria. Antennæ not so long as head and thorax. Rostrum reaches second coxæ. Legs moderately long and thin. Cauda knobbed, with two long and other short hairs. Anal plate bilobed and bristly. Wings with yellowish-brown stigma and yellow to pale brown veins; cubitus once forked; first and second oblique veins unite just before they reach the cubitus.

Length 1.5 to 1.9 mm.

Larva (First Stage). The early stage shows no wax plates at the sides of the body. Colour pale yellow to almost white; at first almost shiny, later becoming covered with a fine white mealy substance. Antennæ dusky at apices, very short, of 5 segments, v. being the longest. On the head are the two typical horns seen in the mature apterous female. In form the larva is elongated and convex, the head and thorax equalling half the length of the whole body, the separation being marked by a more or less deep groove; abdominal segmentation pronounced. The legs are yellow or pallid and extend well beyond the body. Body with a few scattered short hairs. The thick rostrum often reaches beyond the third coxæ. Some specimens at this stage are almost green.

Second larval stage. Colour varying from yellow to ochreous-green; a number of tubercles forming a row round the body excrete a small fringe of wax plates. Eyes very small, often as minute red pigment spots only. Body as in the first instar dusted with a fine white meal. The rostrum shorter and ends between the second and third coxæ. As the insect grows it deepens in colour to almost pale brown, with darker areas and the mealy dusting vanishes.

The *nymphæ* show prominent dusky wing-cases and very soon the antennæ show thin lines or annulations on segments iii. to v.

FOOD PLANTS. *Latania borbonica*; *Acorus calamus*; *Calamus* spp.; various *Orchidaceæ*, especially *Cypripedium*, *Dendrobium* and *Cattleya*, also on *Coelia albiflora*; *Cynoglossum* sp.; *Pritchardia* sp.; *Sobralia* sp.; *Vanda* spp.; *Raphia vinifera* (Ballou); *Raffia* Palms and Palms generally (Ballou).

LOCALITIES. Various places in Great Britain in stove houses, notably on *Orchidaceæ*; France (Boisduval); Belgium (Schouteden); Holland (Van der Goot); Italy; Germany; Zomba, 31 i. 12 (Ballou); St. Lucia and Montserrat, B.W.I., v. 1911 (Ballou); Uganda; Zanzibar; Gold Coast; British Guiana; Malaya; Siam; New Britain, etc. (B.M. Coll.).

Observations. Apparently a tropical species, but it frequently occurs in Europe, under glass, especially in stove houses. The various *Orchidaceæ* seem to be the favourite host plants and then species of Palms. Unless kept in check it may do a great deal of harm to Orchids, and if left alone will increase so rapidly that valuable plants may have all their foliage destroyed. It also encrusts other parts of the plants, including the flower stalks. To the naked eye the apterous Coccid-like females appear as black pustules on the leaves, often occurring in masses, of various sizes. Although the larvæ are active, they do not seem to crawl far. Some kept under observation did not travel more than two inches before they settled down as the Coccid-like mature apterous female stage. The females produce a pallid ring on the leaf, where they are fixed, which may become red and in later stages black. Alatæ do not occur in any great numbers, but now and then a brood of winged females appear and those I observed were very sluggish for winged insects, using their legs more than their wings. The shape of the apteræ varies a good deal, according to the plant they are on and the number present. On one *Cypripedium* I found them so thick that the insects had assumed all manner of abnormal shapes.

Tribe HORMAPHIDINI.

This tribe has a more or less distinct aleyrodiform generation, but not so pronounced as is the *Cerataphidini*. There are no cornicles. All secrete a certain amount of wax from wax glands.

The alatae have antennae of 3 to 5 segments, with narrow annular sensoria. The antennae of the "Stem Mother" also vary from 3 to 5 segments (but rarely the latter). The sexuales are small and apterous and are provided with a rostrum. The oviparous female lays several eggs. The cauda is knobbed and the anal plate bilobed.

Some form galls on leaves. Others live like Coccids on the leaves and twigs.

Two genera can be distinguished:—

1. Antennae of the alatae composed of 3 segments and the hind wings with only media present. *Hormaphis*.
2. Antennae of alatae composed of 5 segments, hind wings with both media and cubitus. *Hamamelistes*.

The latter genus only has so far been found in this country. It approaches in some respects to the genus *Cerataphis*.

Genus HAMAMELISTES Schimer.

Tetraxis Horvath.

Cerataphis Mordwilko (non. Licht.).

Schimer, Trans. America Ent. Soc., 1, 284 (1867); Horvath, Wien. Ent. Zeit., XV., 6 (1896); and Ent. Zeit., XX., 165 (1901); Mordwilko, Zur Biol. u. Morph. d. Pflanz. Biol. Zentralb., XXVII., 793-795 (1907); Ann. d. Zool. d. l'Acad. Imp. d. Sc. Petrograd, XIII., 364 (1908); Tullgren, Arkiv. f. Zool., 14, 49 (1909); Börner, Abhand. Naturwiss. Ver. Bremen, XXIII., 1, 764 (1914); Van der Goot, Holland. Blattläuse, 429 (1915); Rymer Roberts, Mem. and Proc. Manchester Lit. and Phil. Soc., 59, 11, 1914 (1915); Baker, Bull. 826, U.S.A. Dep. Agri., 83, Pl. XIV., I. to X. (1920); Tullgren, Medd. No. 280, f. Central. f. försök. p. jordbruk. Entomo. avdel., No. 44, p. 6 (1925).

Alate viviparous female with rather long, thick antennae of 5 segments; iii. to v. with many narrow annular sensoria. Coccid-like wintering forms with antennae of 3 segments and very marked legs, which are short and thick and devoid of tarsi and also in the aestivalis. Larval antennae of 4 segments. Tarsi of alatae of 2 segments, with capitate hairs. Eyes minute in larvæ, absent in mature hiemalis; large in alatae. Cornicles absent. Anal plate bilobed. Cauda knobbed. Wings flat in repose; fore wings with simple media; hind with media and cubitus. Wax

glands present in apteræ. Sexuales small, apterous, rostrate. Oviparous females lay several ova. Living in leaf galls or as coccid-like bodies on twigs, buds and leaves.

HAMAMELISTES BETULÆ Mordwilko.

Cerataphis betulæ Mordwilko.

Hormaphis betulæ Mordwilko.

Hamamelistes tullgreni Meijere.

Hamamelistes betulæ Tullgren.

Mordwilko, Zur Biol. u. Morph. d. Pflanzenläuse, II., 290, 896-899 (1901); Beitr. z. Biol. d. Pflanzenläuse, Biol. Zentralbt., XXVII., 793-795 (1907); Ann. Mus. Zool. d. l'Acad. Imperiale d. Sc. d. Petrograd, XIII., 365 (1908); Tullgren, Arkiv. f. Zoologi., 14, 57-58 (1909); Meijere, Zeitr. f. Wiss. Insekten-biologie, VIII., 90 (1912); Rymer Roberts, Mem. and Proc. Manchester Lit. and Phil. Soc., 59, 11 (1914-1915); Van der Goot, Beit. z. Kennt. d. Holl. Blattläuse, 430 (1915); Tullgren, Aphid. Stud., II., 6 (1925).

Alate viviparous female. (Sexupara). Head and thorax dark brown; thoracic lobes black. Abdomen paler, brownish-green to rich green. Antennæ and legs dusky. Cornicles wanting. Cauda knobbed. Anal plate bilobed. Antennæ of 5 segments, much shorter than head and thorax; segment i. a little wider and shorter than ii.; iii. longest, nearly as long as iv. + v., with 22-25 narrow sensoria, often much outstanding at edges of segments; iv. with 10-12 sensoria, about as long as v.; v. with 8 to 9 and a very small blunt "nail," with 2-3 short apical bristles. Eyes dark, moderately large, with prominent process. Rostrum short, scarcely reaching second coxæ, but in some to them. Legs rather short and thick, a few short hairs on tibiæ and tarsi. Cauda knobbed, with 2 hairs. Anal plate darker, bilobed, with several hairs. Stigma and veins yellowish-brown; venation varied even in the same specimen.

Length 1.3 to 1.9 mm.

Apterous female (æstivalis). Dark brown to dark violet brown, some rich purplish-brown. Antennæ very short, of 3 segments; i. small and broad; ii. with 3-4 hairs; iii. long and narrower, with very small blunt "nail" and a few apical spines. Rostrum

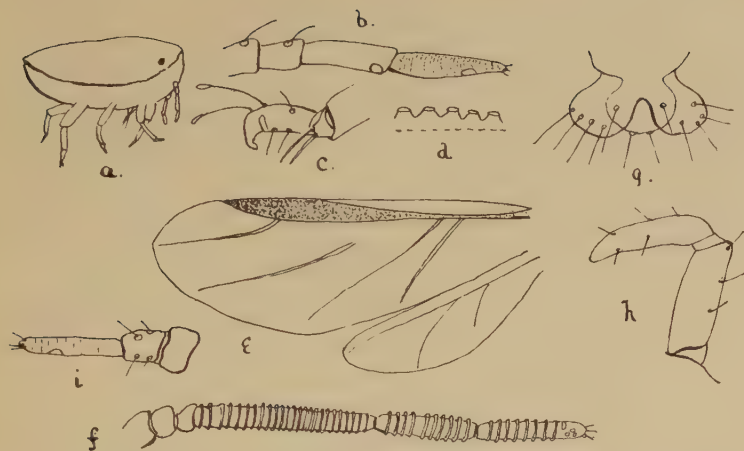


Fig. 188.—*Hamamelistes betulæ* Mordwilko.

a. Larva (aestivalis); b. Antenna; c. Tarsus; d. Cuticle; e. Wings; f. Antenna of alate ♀; g. Cauda and anal plate; h. Leg of aestivalis; i. Antenna of aestivalis. (a. and c. after Tullgren.)

very short and thick. Cornicles appear to be wanting. Cauda prominent and knobbed. Anal plate small, bilobed and only seen in potashed specimens. Legs rather short and thick; on first and second pairs the tarsi are wanting; tibiae ending in a blunt point; both femora and tibiae bear a few hairs; on third pair of legs the tarsus is a blunt knob, with several long hairs, but no claws. Two marked hairs on head and a few small short ones on body. Segment iii. of antennæ shows a small primary sensorium near apex and 3-4 small secondaries, under apex.

Length 1.5 to 1.9 mm.

Hiemalis or over-wintering form. Coccus-like or aleyrodiform. Mature form roughly oval; convex; colour yellow to brownish-yellow or deep brown. Legs and antennæ black, hidden under body. Body rough in texture, due to a waxy secretion given off by the dorsal glands. Traces of segmentation posteriorly. Antennæ very small, of 3 very nearly equal segments. Rostrum very short and thick, with rather long setæ. Legs very short, quite hidden under the scale-like body; tibiae thick and about same length as the thick femora to a little shorter in fore legs and slightly longer in the hind; no trace of tarsi. Anal plate bilobed. Cauda short and broadly knobbed; hidden under last

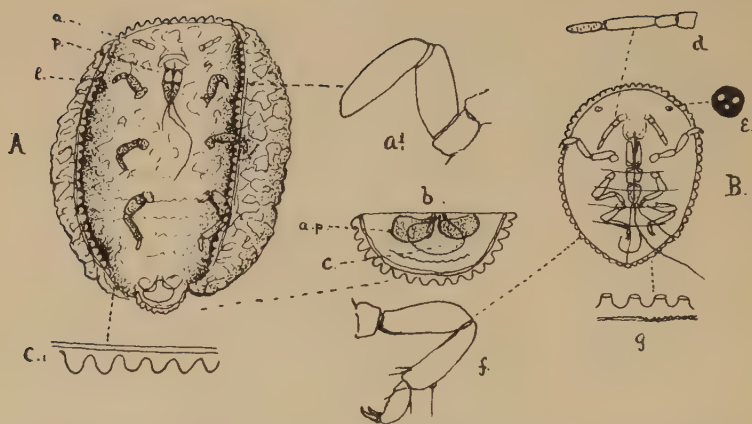


Fig. 189.—*Hamamelistes betulæ* Mordwilko.

A. Hiemalis, late instar, a. Antenna, p. Rostrum, l. Leg; a¹ Leg enlarged; B. Hiemalis, first instar, d. Antenna, e. Eye, f. Leg, g. Frill; b. Apex of body, a.p. Anal plate, c. Cauda.

abdominal segment. Apical border of body with a series of blunt papillæ, forming a narrow fringe. Integument with rugose markings. Eyes absent.

Length 1 to 1.4 mm.

Aestivalis in first instar (larva). Oval, with a marked frill, each papilla being truncated. Yellowish in colour. Legs may just project beyond body. Antennæ hidden, of 4 segments; i. shorter than ii.; iii. longest; iv. a little more than half of iii. to nearly same length, latter imbricated. Rostrum rather thick, reaching to third coxæ; setæ long and projecting beyond the body. Eyes small, of 3 facets on a dark circular patch. Legs with the tarsi developed and of 2 segments; in hind pair there is a prominent hair at apex of tibiæ and two smaller ones on the other side; also 2 or 3 on second tarsal. Tullgren figures two long capitate hairs, which do not show in any of my specimens.

Length .4 to .7 mm.

FOOD PLANTS. *Betula* spp.

LOCALITIES. Windermere, 7 vii. 15; vi. 14; 7. v. 22; 3. x. 15 (Rymer Roberts); Wye, 2 vi. 18; 4 vii. 22; New Forest, vii. 15; Newport, Essex, v. 22; Hastings, v. 17 (F.V.T.); Camberley (E. E. Green); Richmond Park, v. 21; Wimbledon Common (Laing); Stockholm (Tullgren).

Observations. The life-history of this curious Coccid-like Aphid is not yet fully known. The mature form lives in small colonies on the leaves, which they blister by their continual sucking; the blisters may be pale yellow to almost red and amongst the insects is a woolly secretion. Nymphæ appear in July and the alatae fly away from the end of July to about the end of August. At the same time certain apteræ remain and young are produced, small yellow larvæ, which are the young stage of the over-wintering Coccid-like form on the Birch—the hiemalis. As they moult the legs become degenerated and they settle down as a scale-like dark body at the base of a bud or on the smaller twigs. Horvath says the alate sexuparæ are the offspring of the first summer generation or aestivalis i. and makes his aestivalis ii. a parallel generation to the sexuparæ. Rymer Roberts says, "unless there is a third summer generation to correspond with the young larvæ found in June and the mature females taken at the end of August, it appears to me that the aestivalis i. and the sexuparæ must be the progeny of the hiemalis and therefore parallel races, as in analogous cases of *Chermes*. The larvæ and mature females found by me were certainly not parallel to the winged generation, as, according to Börner they should have been in *H. betulinus*."

I have been unable to see any real difference between the insect described by Tullgren as *H. betulæ* and *H. betulinus*. Meijere points out that Tullgren's species differs from Mordwilko's *betulæ* and names it *tullgreni*. Although there are certain differences, they seem to me to be so minute that I cannot help thinking there is only one species and consequently Mordwilko's name *betulæ* must stand. Laing agrees with this (Ent. Mo. Mag., LVIII., 164, 1922).

III.

Sub-family MINDARINÆ.

In this sub-family the radial sector of the fore wings is inserted mesad of the stigma and the sexuales have mouth parts developed. It contains but a single genus the *Mindarus* of Koch. This genus contains what are considered to be the most primitive living Aphides. They have retained the wing structure that is predominant in the fossil forms, the formation of the stigma being especially marked. The oviparæ may lay as many as nine eggs.

The shape of the cauda is also marked and at once separates this sub-family from the *Eriosomatinae*, to which they bear some relationship. There seems little doubt that this genus of Koch's should form a separate sub-family.

Genus MINDARUS Koch.

Koch, Die Pflanz., 277 (1857) ; Tullgren, Arkiv. f. Zoologi, v, 14, 59 (1909) ; Van der Goot, Holland. Blattläuse, 438 (1815).

Antennæ of 6 segments, in the alate female with oval sensoria. The media of fore wings once branched ; the radial sector inserted mesad of the long narrow stigma, the stigmal cell thus being very long ; both media and cubitus present in the hind wings. Cornicles as flat rings. Cauda rather long, conical to spatulate ; never rounded. Wax plates well developed. Sexuales small, apterous, with mouth parts developed. Oviparæ with well developed ovaries, each female may lay as many as nine eggs. They feed on Conifers and distort the twigs.

Two species occur in Europe, the *Mindarus abietinus* of Koch and the *Schizoneura obliqua* of Cholodkovsky. The latter is often considered to be the same as *abietinus* but I think is distinct.

MINDARUS ABIETINUS Koch.

Mindarus (Schizoneura) pinicola Thomas.

Koch, Die Pflanz., 278, figs. 350, 351 (1857) ; Thomas, Eighth Rep. St. Ent. Ill., 137 (1879) ; Nusslin, Forst. u. Jagdzeitung., 210-214, figs. 1-5 (1899) ; Sonderaddruck, a. d' Biol. Centralblatt., XXX., 12, 402 and 13, 440 (1910) ; Leitfaden, d. Forstensecktenkunde Dansk Skorforenings, Tijds., 2, H. (1914) ; Van der Goot, Holland. Blattläuse, 439 (1915) ; Del Guercio, Redia III., 371, figs. 11 and 12 (1916) ; Tullgren, Arkiv. f. Zool., V., 59-61 (1909) ; Patch, Maine Agri. Bull. 182 (1910) ; Ann. Ent. Soc. Amer., II., 14-15 (1909) ; Chrystal, Trans. Roy. Scot. Arb. Soc., XXXIX., 49-59 (1926).

Apterous viviparous female. Green to greenish-yellow of various shades, with darker median bars and between longish darker lateral spots, the bars and spots being various shades of olive-brown. Antennæ and legs much the same colour as body, the former dusky at apices of segments and also the apices of the legs ; tarsi dusky. Body mealy. Antennæ about two and a half

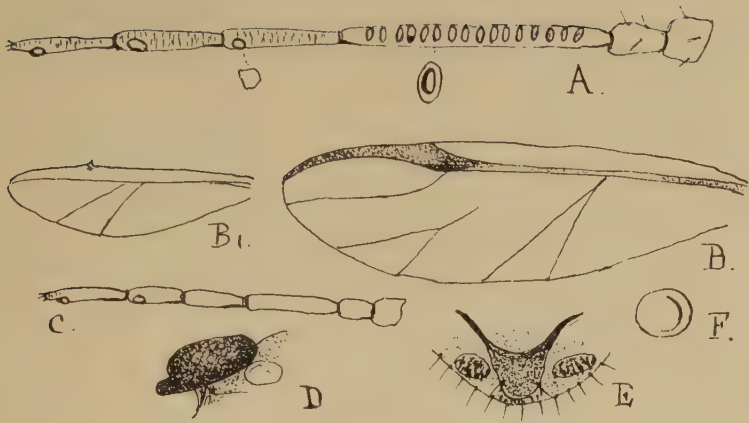


Fig. 190.—*Mindarus abietinus* Koch.

A. Antenna of alate ♀; B. and B1. Wings; C. Antenna of apterous viviparous ♀; D. Eye and stigmata; E. Cauda and anal plate; F. Cornicle.

times shorter than body. Cauda and anal plate dusky. Antennal segment i. larger than ii.; iii. longest; iv. and v. about equal; vi. a little longer than v.; nail very small and blunt; primary sensoria on v. and vi. normal.

Length 1.7 to 1.9 mm.

Alate viviparous female. Yellowish-green to rich clear brownish-green to green, with whitish meal; head and thorax shiny black; pronotum brownish-green; abdomen with greyish-black to black median bars (5-7) and dusky lateral spots. Cauda and anal plate dusky to black. Antennæ and legs dark; legs paler at bases. Eyes large, reddish, with large ocular processes. Wings iridescent, the long stigma dark grey to black; base of wings honey-yellow. Rather narrow in form. Antennæ about as long as head and thorax, of 6 segments; i. a little wider than ii., about the same length; iii. much the longest, as long as iv. + v., with 15-20 elongate oval sensoria; iv., v. and vi. about equal; iv. with an irregular shaped apical sensorium; v. with one elongate oval sensorium; vi. with very short, blunt "nail" and a few apical spines; iv. to vi. striate. Vertex flat. Rostrum pale, apex dark, reaching to third coxæ. Cauda bluntly conical, with two marked spines and 1 or 2 small hairs. Anal plate large,

rounded, spiny. The cauda not as a rule projecting from anal plate. Legs moderately long ; tibiæ with short hairs.

Length 2 mm.

Pupa. Pale green, covered with a pale bluish-grey mealy coat. Eyes black. Pronotum with two black spots. Wing pads black. Antennæ slaty-grey, apices black ; mealy. Legs grey ; tarsi jet black. Abdomen green, with round lateral dusky spots, largest on the apical segment ; segments v. to viii. have also 2 spots in the centre. Antennæ of 6 segments, short, not coming below the third legs. The dark glandular spots give out tufts of white wool, in fan-shaped masses.

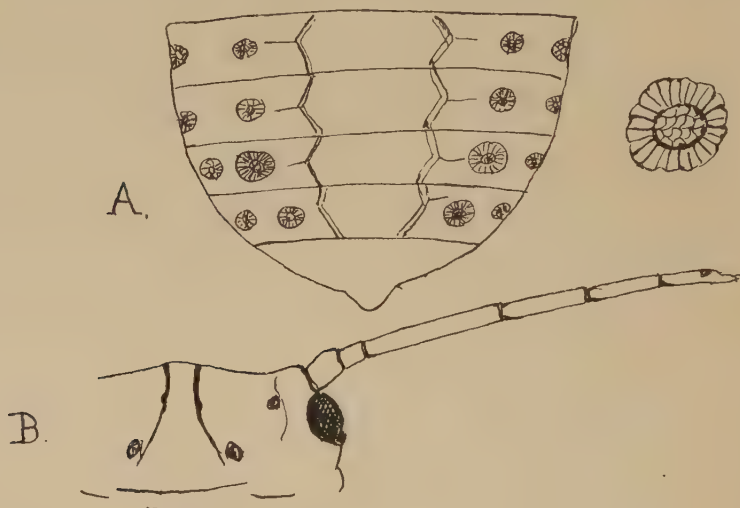


Fig. 191.—*Mindarus abietinus* Koch.

A. Apex of nymph and wax glands ; B. Head of pupa.

Larvæ. Bright apple green ; two small black specks behind the head. Eyes black. Antennæ short, purplish-black. Legs dusky-black.

FOOD PLANTS. *Abies nordmanniana* ; *A. pectinata* ; *Picea canadensis* ; *P. mariana* ; *Pinus sylvestris*.

LOCALITIES. Wye, 4 vi. 04 (F.V.T.) ; Kew Gardens (Chrystal) ; Germany (Koch) ; N. America (Patch. Ma. Agri. Exp. Sta., 1910).

Observations. This seems to be a rare species in Great Britain. I have often searched for it and others have looked for me in various

parts of the country, but I have only found it once, namely at Wye in 1904. I then found a few alatae and some nymphæ on a single Silver Fir. Chrystal has recently found it on the Silver Firs in Kew Gardens.

The ova are elongated oval and may be found in winter on terminal buds and in the axils of the shoots of the Silver Fir and some other Conifers; the eggs are shiny silvery grey, a glaze over the testa due to minute strands of white waxy wool. The larvæ occur in April and May, and after three months they become the mature Fundatrices. The young or "lice" are first seen collected together in masses, under bud scales and later they occur on the shoots. The Fundatrix gives rise to a second generation which settle on the twigs and there secrete a bluish-white meal and oil globules. Then alatae occur which are devoid of the white covering; some fly to other Firs and these alatae produce the sexuales. None of the sexual forms have so far been found in this country. These Aphides attack the needles and the stems and cause the former to turn brown and dry up. The shoots also become twisted and bent at the seat of attack, resulting in deformed stems. On the Continent shoots are killed by this Aphid.

Cholodkovsky's *Schizoneura obliqua* (Zool. Anz., 257, 1896) is a *Mindarus*. From Nusslin's figures, etc., it seems to me to be a distinct species (vide Biologischen Centralblatt, XXX., No. 12, 408, 1910).

Genus RHIZOBIUS Burmeister.

Burmeister, Handbuch. d. Entomo., II., 87 (1835).

I have not at present been able to fix this genus or most of the insects placed in it.

KALTENBACHIELLA MENTHÆ Schouteden.

Mém. Soc. Ent. Belg., XII., 795 (1906).

I have recorded what is apparently this species under Passerini's name *Rhizobius menthæ* (Entomologist, XLVIII., 275, 1915). A root feeding Aphid was sent me by Mr. Fryer, found on the roots of Water Mint (*Mentha aquatica*) at Chateris, Cambridgeshire, in September, 1914. The few apteræ produced much white wool. Unfortunately I only mounted one poor specimen so am unable to give a description of it.

APPENDIX.

MACROSIPHUM GNAPHALII Walker.

Aphis gnaphalii Walker.

Walker, Zoologist, VII., 1. (1849).

Apterous viviparous female. Antennæ longer than body, dark ; segment i. larger than ii ; iii. about one and a half times length of iv., no secondary sensoria ; iv. a little longer than v. ; vi. with base rather more than one-third of v. ; primary sensoria normal ; a few short hairs on all segments. Rostrum rather thick, reaching past second coxæ. Cornicles black, cylindrical, swelling at base and slightly towards apex, about as long as antennal segment iv. ; apex reticulate. Cauda pale, about three-quarters of cornicles, broad, acuminate ; hairs 4 and 3 + 2 dorsal. Anal plate pale, 3 marked hairs each side. Legs moderate ; femora mostly dark ; tibiæ with many hairs.

Length 1.8 mm.

Redescribed from a slide in the British Museum, mounted by Mr. F. Laing from a carded specimen.

FOOD PLANT. Cudweed (*Gnaphalium germanicum*).

Walker gives the colour pale red, a row of black dots each side of abdomen, which is greenish towards the tip ; antennæ and cornicles black.

MACROSIPHUM PICRIDIS Fabricius.

Aphis picridis Fabricius.*Aphis cichorii* Dutrochet.*Siphonophora picridis* Passerini.

Fabricius, Syst. Ent., 737 (1775) ; Ferrari, Aphid. Liguriæ, 58 (1872) ; Kaltenbach, Mono. Pflanz., 27 (1843) ; Passerini, Aphid. Ital., 11 and 16 (1863) ; Schouteden, Mém. Soc. Ent. Belg., XII., 240 (1906) ; Van der Goot, Holland. Blattläuse, 82 (1915).

Alate viviparous female. Head and thorax black ; abdomen brown, with black lateral spots. Antennæ black. Legs black, tibiæ yellow at base. Cornicles black. Cauda yellow. Antennæ longer than body, with short hairs ; segment i. larger than ii. ;

iii. longer than iv. ; iv. a little longer than v. ; base of vi. about one-third of v. ; flagellum about four and a half times longer than base ; iii. with 76-82 sensoria.

Length 3.5 to 3.7 mm.

Apterous viviparous female. Brown to deep reddish-brown, more or less metallic sheen ; antennæ black. Legs black, except base of tibiæ which are yellow. Cornicles black. Cauda yellow. Dark lateral abdominal spots. Antennæ longer than body ; segment i. much larger than ii. ; iii. much longer than iv., with 59-75 sensoria over whole length ; iv. a little longer than v. ; vi. with base $\frac{1}{4}$ of v. ; flagellum long, five times basal area. Rostrum reaches third coxæ. Body when cleared shows dark spots, from which hairs arise and a large dark patch caudad of cornicles. Cornicles cylindrical, expanding basally, apices reticulate remainder imbricate. Cauda with several pale hairs, acuminate, about half cornicles. Antennæ and legs with stiff hairs.

Length 3 to 3.5 mm.

Oviparous female. Apterous, oval. Reddish-brown to deep brown. Cauda, cornicles and legs as in apterous viviparous female. Antennæ longer than body ; segment iii. much longer than iv. ; iv. a little longer than v. ; base of vi. about one-third of v. ; flagellum about five times base ; iii. with 25-40 sensoria. Hind tibiæ with many sensoria. Rostrum to third coxæ. Body showing transverse rows of black spots, with one or more hairs from each (in cleared specimens).

Length 2.5 mm.

Male. Alate. Head and thorax black. Abdomen dull dirty green to brown. Antennæ longer than body ; segment i. larger than ii. ; iii. a little longer than iv. ; iv. a little longer than v. ; base of vi. $3\frac{1}{2}$ times shorter than v. ; flagellum $4\frac{1}{2}$ times of base ; iii. with 45-55 ; iv. with 10-12 ; v. with 9-10+1 ; vi. with 0-1+1 sensoria.

Length 2.3 to 2.6 mm.

FOOD PLANTS. *Picris hieracioides* ; *H. pilosellæ* : *Hypocharis radicata* ; *Cichorium intybus*.

LOCALITIES. East Malling (Massee) ; Torquay, 2 x. 21 (Gipps) ; Middlewood (Britten) ; Epping Forest (Laing) ; Camberley (Green) ; Wageningen, Bussum, Gorsel, Holland (Van der

Goot); Belgium (Schouteden); Italy (Ferrari and Passerini); Germany (Kaltenbach).

MACROSIPHUM NIGROCAMPANULÆ Theobald.

Ent. Mo. Mag., LXIV., 224 (1928).

Apterous viviparous female. Deep black. Legs yellow, except apices of femora, tibiæ and tarsi. Frontal lobes large. Antennæ black, longer than body; segment i. much larger than ii.; iii. long, with 120-135 sensoria over its whole length; iv. about as long as v., with no sensoria; v. with the usual primary; flagellum of vi. long. Cephalic hairs simple, antennal hairs partly capitate, Rostrum black, reaching third coxæ. Body hairs long. Cornicles long and rather narrow; jet black; large reticulate apical areas, remainder imbricate; slightly swollen at the base. Cauda black, long, pointed, with several long hairs each side, more than half length of cornicles. Body when cleared shows rows of black spots from which the hairs arise and a large black patch at the base of the cornicles and two dark bars behind. Femora and tibiæ hairy.

Length 3 mm.

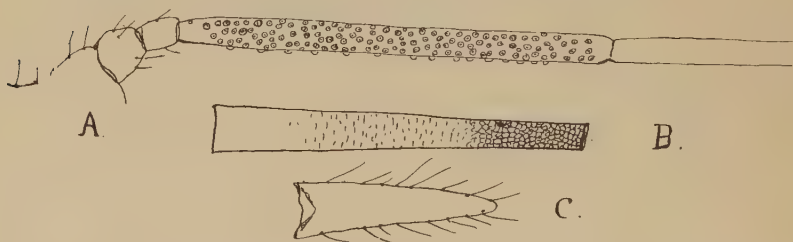


Fig. 192.—*Macrosiphum nigrocampanulæ* Theobald.

Apterous viviparous ♀; A. Head and third antennal segment; B. cornicle; C. Cauda.

Alate viviparous female. Deep black, except basal half of femora and basal two-thirds of tibiæ which are yellowish. Frontal lobes very large. Antennal segment i. much larger than ii.; iii. long, with 160-170 sensoria all over it, giving a marked tuberculate appearance (remaining segments missing); lateral lobes and antennæ with rather short hairs. Cornicles long, thin, cylindrical, more than half as long as antennal segment iii.; apices reticulate, remainder imbricate. Cauda acuminate, not

quite half the length of the cornicles, with numerous hairs each side. Body with rather long hairs. Rostrum black, hairy, reaching to or just past second coxæ. Legs with hairy femora and tibiæ. Wings large; stigma deep yellowish-brown; veins brown.

Length 3 mm.

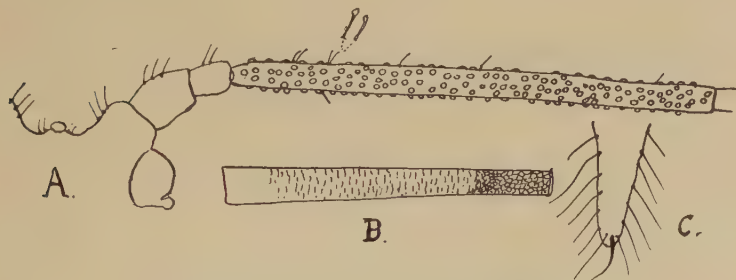


Fig. 193.—*Macrosiphum nigrocampanulæ* Theobald.
Alate ♀; A. Head and third antennal segment; B. cornicle; C. Cauda.

FOOD PLANT. Giant Campanula (*Campanula latifolia*).

LOCALITY. Settle, N.W. Yorkshire, viii. 28.

Observations. A large black species found by Mr. Walsh on the Giant Bell Flower or Campanula, which is plentiful around Settle. It resembles at first sight *Macrosiphum compositæ* Theob., but differs from that African species in (1) having many more sensoria on segment iii. in the apteræ, (2) in the longer and narrower cornicles, and (3) in the longer and simple cephalic and body hairs. The apteræ occurred in abundance, but only one alate female was sent me, and the apical segments of the antennæ were missing. *Types* in the writer's collection.

MACROSIPHONIELLA TRIGLOCHINIELLA Theobald.

Entomologist, lxi, p. 8, figs. 1 and 2 (1928).

Apterous viviparous female. Deep brown, bronzy brown or very deep greenish-brown; venter greenish-brown to green. Antennæ dark. Legs greenish, apices of femora and tibiæ and the tarsi dark. Cornicles black. Cauda pale greenish to pallid brown. Antennæ shorter than body; segment i. much larger than ii.; iii. longer than iv., shorter than to equal to flagellum of vi.,

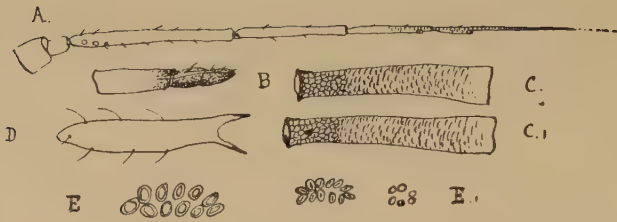


Fig. 194.—*Macrosiphoniella triglochiniella* Theobald.

Apterous ♀; A. Antenna; B. Rostrum; C. and C.i. Cornicles; D. Cauda; E. and E.i. Abdominal glands.

with 1-5 sensoria near base, of irregular size; iv. a little longer than v.; v. with normal sensorium; vi. with base nearly half of v.; flagellum long, but not quite so long as iv. + v. Rostrum very short and thick, not reaching second coxæ; last two segments and apex of ante-penultimate joint dark. Cornicles thick, cylindrical, swelling basally, apex reticulate, remainder strongly imbricate. Cauda nearly as long as cornicles, 3 hairs each side and 1 apical. Abdomen in cleared specimens shows broad transverse bars and has marked glandular system on each side; short scattered hairs on body. Legs with many short hairs on tibiæ, a few on femora.

Length 3 mm.

Alate viviparous female. Head and thorax pale brown and deeper brown; thoracic lobes black to deep brown. Abdomen green. Antennæ with segments i. and iii. deep brown; iv. and v. paler, with dusky apices; vi. dark. Rostrum green, apex dark.



Fig. 195.—*Macrosiphoniella triglochiniella* Theobald.

Alate viviparous ♀; A. Antenna; B. Cornicle; C. Cauda; D. Apex of Rostrum.

Cornicles black. Cauda pale greenish. Legs green, with most of femora dark, apices of tibiæ and the tarsi dark. Antennæ shorter than body; segment i. larger than ii.; iii. longer than iv., with a line of 14-16 round sensoria on one side, not quite reaching the apex; iv. and v. about equal; v. about 3 times as long as base

of vi. ; flagellum long, not so long as iv. + v. Rostrum short and thick, reaching half-way between first and second coxæ. Cornicles cylindrical, expanding basally and slightly at apices, about as long as antennal segment v. ; apex reticulate, remainder markedly imbricate. Cauda not quite so long as cornicles, thin, but thicker than cornicles, with 3 hairs each side and 1 dorso-apical. Body with a few hairs in a line on each segment. Legs long, with short, stiff, dark hairs, especially on tibiæ. Wings normal ; costa and stigma greenish.

Length 2.8 to 3.0 mm.

FOOD PLANT. Sea Arrow Grass (*Triglochin maritimum*).

LOCALITY. Churchtown, near Southport, viii. 27 (A. Dallman).

Observations. Described from a number of apterous females and one alate female. The apteræ are easily demarked by the glandular structure, which does not show in the alate female. Mr. Dallman says the insect was not generally common.

Types in the writer's collection.

AMPHOROPHORA TRIBULIS (Walker).

Aphis tribulis Walker.

Megoura tribulis Theobald.

Walker, Zool., VII., 34, App. (1849) ; Theobald, Brit. Aphid., I., 175 (1926) ; Laing, Entomo., LXI., 208 (1928).

Apterous viviparous female. Black ; abdomen with a rim each side and two rows of tubercles down the back ; antennæ black, segment iii. yellow at base, a little longer than the body.



Fig. 196.—Antennal segment iii. of *A. tribulis* Walker (F. Laing).

Cornicles dark. Cauda yellow. Antennal segment iii. with 20 small sensoria along one side ; iv. longer than v. Rostrum rather thick, reaching past third coxæ. Cornicles about as long as segment v., somewhat expanded on apical half, contracted at apex, imbricate. Cauda pointed, about three-quarters length of

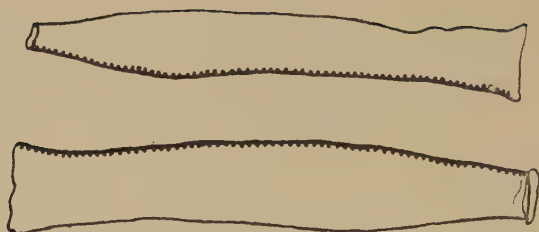


Fig. 197.—Cornicle of *A. tribulis* Walker and of *M. viciae* Kalt. (below) (apterous viviparous ♀♀). (F. Laing.)

cornicles, 3 hairs each side ; from the dark abdominal spots arise hairs and there is a large dark patch caudad of the cornicles (seen in the cleared specimen). Legs long, rather thick, bases very dark, also apices of femora and tibiae ; tarsi dark.

FOOD PLANTS. *Vicia sepium* (Walker) ; *Vicia lutea* (Britten).

LOCALITY. Skirwith, Cumberland (Britten).

Observations. Described from Walker's specimen in the British Museum. It was first placed in *Megoura*. The species was rediscovered by Mr. Britten and recorded by Mr. Laing, who now places it in *Amphorophora*. Walker gives no locality. The two figures are from sketches sent me by Mr. F. Laing.

AMPHOROPHORA DIGITALISII Theobald.

Ent. Mo. Mag., LXIV., 226 (1928).

Apterous viviparous female. Bright apple-green ; antennæ dusky green ; apices of segments iii. and iv. dark ; v. and vi. much darker, and imbricate ; longer than the body. Segment i. larger than ii., both with capitate hairs ; iii. longer than iv., with 22-25 round sensoria of varied size, passing on one side nearly to the

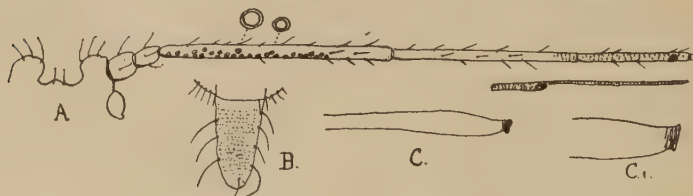


Fig. 198.—*Amphorophora digitalisii* Theobald.
Apterous ♀ ; A. Head and antenna ; B. Cauda ; C. and C1. Cornicles.

apex ; flagellum moderately long ; iii. to v. with simple hairs. Frontal lateral lobes prominent and marked, with some capitate hairs. Legs rather long, green, hairy ; apices of tibiæ and the tarsi black. Cornicles long, swollen on the apical half, green, apices black ; as long as antennal segment iv. ; a few striæ at the apices. Cauda thick, sides straight, pale, more than half the length of the cornicles ; three hairs one side, four to five the other and one apical. Anal plate green, rounded, with many fine short hairs. Body with scattered capitate hairs, most prominent in front and behind.

Length 2.3 mm.

FOOD PLANT. Foxglove (*Digitalis purpurea*).

LOCALITY. Falling Foss, six miles from Whitby, Yorkshire, 17 vii. 28 (Walsh).

Observations. Described from living apteræ sent me by Mr. Walsh. It is a marked *Amphorophora*, distinct from anything I know. *Type* in the writer's collection.

Aphis rumicis Linn., *Anuraphis padi* Linn., and *Myzus persicæ* Sulzer are common on wild and cultivated Foxgloves, both *Digitalis purpurea* and *D. lutea*. Walker described two aphides from the Foxglove ; one, *Aphis consumpta*, is *A. padi* ; the other, *Aphis pilosa*, is apparently distinct, being pale brown and hairy above, pale red beneath, and the black antennæ pale red at the base ; the legs dull yellow, with black tarsi and tips to the tibiæ and femora brown. (Zoologist, vii., 54, App. 1849). Miss Patch also finds *M. pseudosolani* Theobald on this plant, where it lays its eggs.

RHOPALOSIPHONINUS RIBESINA Van der Goot.

Rhopalosiphum ribesina Van der Goot.

Van der Goot, Beitr. z. Kennt. d. Holländischen Blattläuse, 145 (1915) ; Theobald, Ent. Mo. Mag., LXIII., 33 (1927).

Alate viviparous female. Head and thorax black ; abdomen deep brown ; antennæ, cornicles and cauda black to deep brown, legs brownish-black ; tibiæ paler except apices ; rostrum reddish-black to black. Antennæ longer than body ; segment i. much larger than ii. ; iii. longer than iv., but not quite so long as iv. + v.,

with 45-55 sensoria over most of length ; iv. a little longer than to equal to v., with 10-18 sensoria, mainly on one side ; v. with 0-1 ; base of vi. not quite half iv. ; flagellum nearly as long as iii., sensoria 1 (+6). Rostrum reaching past second coxæ, often to the third coxæ. Cornicles large and much inflated on the apical half, with a few apical striæ, corrugated at the base. Cauda rather short, pointed, spinose, less than one-third of cornicles ; 2 hairs each side. Anal plate spinose with several hairs. Tibiæ with many short hairs ; femora with a few on one side. Frontal lobes rugose, much porrected, with several hairs. When cleared the abdomen shows large dark lateral spots, small dark sub-median patches and some small dark spots in the middle. Wings normal.

Length 2.9 to 3 mm.

Apterous viviparous female. Deep reddish brown to dull brownish ; antennæ black, except segment iii. and base, which are bright brown ; legs dark brown, tibiæ paler ; cornicles and cauda dark brown to black. Antennæ longer than body ; i. much larger than ii. ; iii. much longer than iv., longer to nearly equal to iv. + v., with 9-10 sensoria on basal half, mainly on one side ; iv. a little longer than v. ; base of vi. more than half of iv. ; flagellum long, longer than iii. Rostrum reaches to third coxæ. Frontal lobes much porrected and rugose, with some short, capitate hairs, also the basal antennal segments. Cornicles as in alate female. Cauda with 2 hairs each side, less than to nearly one-third of cornicles. Legs with hairs on tibiæ and femora.

Length 2.8 to 3 mm.

FOOD PLANT. Red Currant (*Ribes rubrum*).

LOCALITIES. Aberystwyth, vii. and viii. 26 (Jenkins) ; Wageningen, Holland, vi. (Van der Goot).

Observations. A very marked *Ribes* feeding species so far only found once in this country. Mr. Jenkins found large colonies on the old wood of Red Currants. Alatæ appeared in August and flew away.

RHOPALOSIPHONINUS TUBERCULATUS Theobald.

Ent. Mo. Mag., LXIV., 226 (1928).

Alate viviparous female. Dark ; abdomen paler than head and thorax, with darker transverse irregular bars. Cauda and

cornicles dark, also antennæ and legs, except base of femora and most of the tibiæ. Antennæ about as long as body; segment i. larger than ii.; iii. much longer than iv.; iv. a little longer than v.; flagellum long; iii. with 85-89 sensoria all over it, of irregular

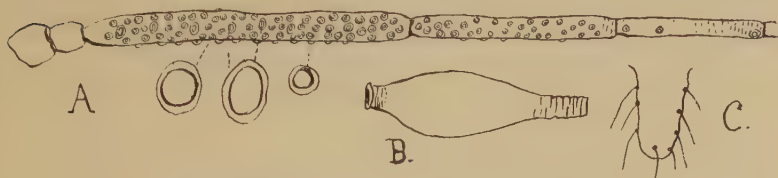


Fig. 199.—*Rhopalosiphoninus tuberculatus* Theobald.
Alate viviparous ♀; A. Antenna; B. Cornicle; C. Cauda.

size and shape, some round, others oval, with sharp double contours, iv. with 34 smaller round sensoria all over it; v. with 2+1. Cornicles widely vasiform, stem corrugated, a few striæ at apices, about equal in length to segment iv. of the antennæ. Cauda thick, not so long as cornicles, with 4 hairs one side, 3 the other, and 1 apical. Cleared specimens show 5 irregular dark abdominal transverse bars and short body hairs in transverse lines.

Length 2 mm.

FOOD PLANT. Giant Campanula or Bell Flower (*Campanula latifolia*).

LOCALITY. Settle, N.W. Yorkshire, viii. 28 (Walsh).

Observations. Described from one perfect alate female. Several young green larvæ were present. It occurred with *Macrosiphum nigrocampanulæ*. It can at once be demarked from other of our *Rhopalosiphoninus* by the much greater number of antennal sensoria, which have a very pronounced double contour and some are markedly oval and larger than others.

Type in the writer's collection.

CAPITOPHORUS CHRYSANTHEMI Theobald.

Theobald, Bull. Ent. Res., XI., pt. IV., 69 (1920); Hall, Aphid. Egypt. Tec. & Sc. Service, Bull. 68, 35 (1926); Theobald, Entomologist, LXI., 49 (1928).

Apterous viviparous female. Pale green to yellow; eyes black; apices of cornicles and antennæ dusky; tarsi dark and to

some extent the apices of tibiæ ; hairs capitate. Antennæ longer than body ; segment i. larger than ii. and angulated on its inner side ; iii. much longer than iv., but not as long as vi. ; iv. a little longer than v., primary sensorium normal ; flagellum long, basal area one-fourth of segment v. Head with marked frontal lobes and a median raised process, with 2 capitate hairs on each lobe, 2 in front on median lobe, and 2 just above them. Eyes prominent. Rostrum pale, reaching to or just past second coxæ ; apical segment narrow and acuminate, penultimate nearly as long, expanded. Tibiæ with rather long, fine hairs and a few on apex of femora. Cornicles long and very thin, pale, apex dark, about as long as antennal segment iv. Cauda pale, rather long and thick, 2 hairs each side, close together towards apex and a dorso-apical one. Anal plate slightly darkened, rounded, with a few long hairs. Body hairs strongly capitate. A small tubercle above the cauda.

Length 1.8 to 2 mm.

Alate viviparous female. Pale yellowish to pale green ; head and thorax brown. Head with frontal lobes, with 2 capitate hairs on each and 4 on the median process, which is small. Antennæ dusky at apices and tips of segments iii. to v., longer than body ; segment i. much larger than ii., angulated on inner margin ; iii. longer than iv., with 10-18 sensoria in a line along its whole length ; iv. equal to or a little longer than v. ; vi. very long, equal to iii. + iv., basal area about one-third of v. and one-eighth of flagellum. Rostrum not quite reaching second coxæ. Cornicles long and thin, imbricate, slightly expanded basally and some apically ; a little shorter than antennal segment v. Cauda long, with 2 hairs each side and 1 median dorso-apical ; about half length of cornicles. Anal plate broadly rounded, with a few long simple hairs. Body hairs capitate.

Length 1.8 to 2 mm.

FOOD PLANT. Chrysanthemums.

LOCALITIES. Swanley, xii. 27 ; Bloemfontein, Orange Free State, 18 v. 14 ; Cairo, xi. 05 (Willcocks), ii.-vi. and xi.-xii. (Hall).

Observations. I described this from South Africa and then Willcocks and Hall found it in Egypt. In 1927 Miss Wilson sent me numbers of apteræ and a few alatæ from Swanley. It occurred in colonies of 20 up to 200, under the leaves closely packed together, but they did not seem to do much damage. They

mainly occurred on the pallid leaves, but not entirely so. Alatae in small numbers hatched out in December and January. In Cairo it does not appear to be a common insect. In the original description of the apterae I missed out the sensoria on antennal segment iii., they vary from 0-8.

Types in the writer's collection.

Genus MYZOTOXOPTERA Theobald.

Entomologist, LX., p. 31, 1927.

Frontal lobes porrected as in *Myzus*. Antennae longer than body with round sensoria, on segments iii. and iv. in the alatae, and on iii. in apterous viviparae and oviparae. Cornicles moderately long, with slight swelling near middle, but much shorter than segment iii. of the antennae. Cauda very small, triangulate. Wings with cubitus with one fork, which is large. Hind tibiae of oviparae narrow and rather long, sensoria small. Related by the cephalic structure to *Myzus* and to *Toxoptera* by the venation.

MYZOTOXOPTERA WIMSHURSTÆ Theobald.

Entomologist, LX., p. 31, 1927.

Apterous viviparous female. Globular. Deep blackish green, brownish-green to dirty brown. Head, cornicles, cauda, anal plate and coxae blackish; a large dark bar behind cornicles and traces of a small one; some dark spots show on abdomen in cleared specimens. Antennae and rostrum deep brownish green, base of former black. Legs same colour as body to rich fawn; some show darker apical areas to tibiae and mid and hind femora.

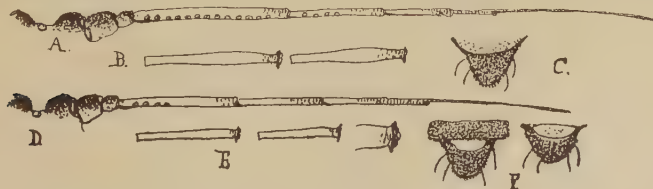


Fig. 200.—*Myzotoxoptera wimshurstæ* Theobald.

A. Head and antenna of alate ♀; B. Cornicles (further enlarged); C. Cauda; D. E. F., the same, of apterous ♀.

Antennæ long, longer than body. Segment i. much larger than ii. ; iii. longer than iv., shorter than flagellum, with 3 to 4 sensoria near base ; iv. longer than v. ; base of vi. from two-thirds to more of v. ; flagellum long. Rostrum reaches to second coxæ. Cornicles more or less cylindrical, narrow, slightly swelling towards middle or towards apex, apex much constricted and flared, about as long as antennal segment iv. Cauda small, bluntly triangulate, spinose ; 2 hairs each side. Frontal lobes of head and basal segment of antennæ rugose, as in *Myzus*.

Length 1.9 to 2.6 mm.

Alate viviparous female. Antennæ longer than body ; segment i. much larger than ii. ; iii. longer than iv., not so long as flagellum of vi., with 10-13 sensoria along whole length ; iv. longer than v., with 3-5 sensoria on basal area ; base of vi. about two-thirds of v. ; flagellum long. Head and thorax dark. Abdomen in cleared specimens showing dark median bars and spots of a darker colour as shown in figure. Antennæ, cornicles and cauda dark.



Fig. 201.—*Myzotoxoptera wimshurstæ* Theobald.
Body-markings of alate ♀.

Rostrum reaches to third coxæ. Cornicles cylindrical, very slightly swelling in middle or towards apices, which are much flared, faint imbrications, about as long as antennal segment iv. Cauda small, spinose, 2 hairs each side. Cubitus once forked ; veins and stigma brown.

Length 2 to 2.3 mm.

Oviparous female. Apterous. Head and thorax black ; abdomen deep green of various shades, a large dark median bar and a smaller one, both caudad of cornicles and 2 rows of black lateral

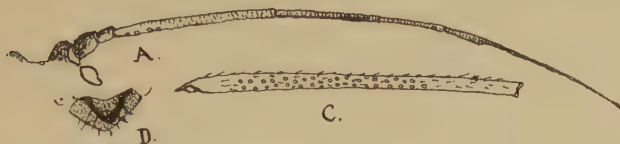


Fig. 202.—*Myzotoxoptera wimshurstæ* Theobald.

A. Head and antenna ; C. Hind tibia ; D. Cauda and anal plate (all of oviparous ♀).

spots, the mesad ones largest. Antennæ deep greenish-brown ; segments i. and ii. black. Cauda deep brown to black. Legs same colour as body, some rich fawn colour ; mid femora darker, also apices of tibiæ. Antennæ longer than body, curved ; segment i. much wider than ii. ; iii. longer than iv., but not so long as flagellum, with 3-4 round sensoria near base ; iv. considerably longer than v. ; base of vi. two-thirds of v. ; flagellum as long as iv. and v. Cornicles cylindrical, irregular in outline, some showing slight median swelling, apices flared, as long as antennal segment iv. Cauda very small, triangulate ; 2 hairs each side. Hind tibiæ narrow, with 35-40 small round pale sensoria in middle. Rostrum green, with 2 dusky bars and dusky apex, reaching to second coxæ.

Length 1.3 to 1.9 mm.

FOOD PLANT. Bitter Cress (*Cardamine hirsuta*).

LOCALITY. Brenchley, Kent.

Observations. Described from a number of specimens found by Miss Wimshurst. Apterous females were found in early spring on the young Bitter Cress growing in damp situations. The aphides are nearly always crowded around the bases of the radial leaves, and often immersed in mud. Several generations of apteræ occur in the early spring, and then a late summer form appears. A few apteræ remain on the plants all the summer in a more or less dormant condition, and these increase again in autumn. Miss Wimshurst collected specimens for me in mid-November, and these all proved to be oviparæ.

This insect is very marked and must be placed in a new genus. The general form is that of a typical *Myzus*, but the venation, which is constant, is that of *Toxoptera*.

The very narrow hind tibiæ of the oviparous females are also very characteristic, and also the small cauda.

In general appearance it resembles *Myzus cerasi*, but the generic character given, especially the much longer antennæ of the apterous viviparæ and oviparæ, at once demark it. In *Myzus cerasi* the cornicles of the apteræ are longer than antennal segment iii.; in this species they are shorter and about equal segment iv. Described from a number of specimens, the apteræ and oviparæ from living specimens.

Types in the writer's collection.

MYZUS MORISONI Laing.

Entomologist, LXI., p. 209 (1928).

"*Apterous viviparous female*. Ovate, plump, greenish (spirit specimens), with the head, antennæ, thoracic segments, rostrum, a small area between the cornicles in front of the cauda, legs, cornicles and cauda, dark. The proportions of the segments of the antennæ are (i.) 30, (ii.) 30, (iii.) 100, (iv.) 85, (v.) 60, (vi.) 40 + 70; segment i. closely set, ii., iii. and iv. more sparsely, with minute roundish scale-like tubercles, these giving place on v. and vi. to the more normal imbrications; primary sensorium on vi. compound. Head and thorax, and the small dark area in front of the cauda, studded with minute rounded tubercles; the low antennal tubercles project inwards very markedly, giving the front margin of the head a flat, urn-shaped appearance. Rostrum short, scarcely reaching second pair of coxæ. Abdomen with a small, blackish lateral spot at junction of each segment, and one or two medianly on the first; derm rather coarsely shagreened. Cornicles slender, almost cylindrical, not flanged at apex, imbricated, gently curved, subequal to antennal segment v.. Cauda short, about two-thirds length of cornicles, ovate-conical.

Length 1.38 mm. *Breadth* 0.8 mm.

FOOD PLANT. *Dactylis glomerata*.

LOCALITY. Newburgh, Aberdeenshire."

MYZUS PLANTAGINEUS Passerini.

Passerini, Gli Afidi, 35 (1860).

Apterous viviparous female. Green; apices of cornicles, antennæ, tibiæ and tarsi dark. Eyes red. Legs same colour as body. Antennæ about $\frac{2}{3}$ length of body; segment i. larger than ii., iii. longest; iv. longer than v.; vi. shorter than iv. + v., basal area about $\frac{1}{2}$ of of v., and $\frac{1}{3}$ of flagellum, which is not quite so long as iv.; most of iv. to vi. dark. Rostrum thin; yellowish-green, apex dark, reaching to third coxæ. Cornicles cylindrical, slightly expanding basally, about as long as antennal segment iv.; imbricate. Cauda green, small, about $\frac{1}{3}$ of cornicles, 2 hairs each side and 1 medio-dorsal. Anal plate rather small, slightly darker than cauda. Legs rather long and thick.

Length 1.3 to 1.8 mm.

FOOD PLANT. *Plantago* spp.

Observations. Redescribed from a number of apteræ found clustered in the flower heads and up the flower stalks of both Broad and Narrow Leaved Plantains in several localities near Wye. Some plants being literally covered with the insects.

MYZUS QUASIPYRINUS sp. nov.

Apterous viviparous female. Large, globular; deep blackish-brown, paler at the sides; antennæ yellowish to yellowish-brown, base and apex dark; cornicles long, black; cauda short and black; legs brown, base of femora and tibiæ yellowish; tibiæ dark at apices. Antennæ shorter than body; segment i. wider than ii.; iii. longer than iv.; iv. a little longer than v.; base of vi. about $\frac{2}{3}$ of v.; flagellum about $2\frac{1}{2}$ times length of base. Frontal lobes, rugose, markedly porrected. Pronotum sharply defined, with prominent lateral projections. Cornicles long, thick, cylindrical, contracted at apices, longer than antennal segment iii., strongly imbricated. Cauda small, acutely triangulate, a few pale hairs each side, spinose. Anal plate very dark, rounded. Abdomen with very small lateral papillæ. Legs moderately long, and with a few very fine hairs on the femora and tibiæ. Rostrum reaches to second coxæ. Segments i. and ii. of antennæ dark, also v. and vi. Pronotal papillæ small.

Length 2 to 2.5 mm.

FOOD PLANT. Pear.

LOCALITY Wye, I. viii. II.

Observations. Apterous viviparous females were found in plenty on a pear tree up my house in 1911, but I have not seen this insect since. It curled the leaves and did a good deal of damage. A few nymphæ occurred, but none hatched out. This is the only dark *Myzus* I have seen on the Pear. It is a heavy built species. It may be Ferraris' *pyrinus* but without *alata* it is difficult to say and for the time being I give it the name *quasipyrinus*.

NOTE ON *Myzus pseudosolani* THEOBALD (– *solani* Kaltenbach).

Miss Edith Patch (Bull. 346 Maine Agri. Exp. St., July, 1928) has shown that this *Myzus* has the Foxglove (*Digitalis purpurea*) as its primary host. Specimens taken by her in Great Britain in 1928 at Oxted, Surrey on May 29th; Pont-Cwn-bydew, Berwyn Mountains and near Harlech, N. Wales, on June 12th, Keswick June 23rd, York, July 2nd and Glencoe, Scotland, June 27th, on Foxgloves, exactly agree with the type of *pseudosolani* and the same species found in North America, where she has traced it wintering on *Digitalis* in the egg stage. Egg-laying begins on the Foxglove in September and extends through October. The males are wingless as well as the oviparæ. No sexuales have yet been found in Great Britain. She gives a long list of plants upon which the species can live during summer in North America.

NOTE ON *Aphis solani* OF KALTENBACH.

In 1843 Kaltenbach (Mono. Pflanz., p. 15) described an *Aphis solani* from potato and placed it between *Aphis urticæ* (Schrk) and *Aphis cerealis* (Kalt.). Its status has never been settled. Being placed between two *Macrosiphum* one would expect it to come in that genus and so the name *solani* take precedence over Koch's *gei*; but Kaltenbach describes the cauda as being one-third the length of the cornicles; this is not so in the common green potato Aphid recently traced to be Koch's *gei*. On the other hand the cauda of my *Myzus pseudosolani* is about one-third the length of the cornicles and as this is the other common green potato aphid with *gei* we may well take it that it is the same species as described by Kaltenbach as *solani* and I here propose to sink my name *pseudosolani* under *solani* (Kaltenbach).

RHOPALOSIPHUM LAHORENSIS Das.

Stephensonia lahorensis Das.

Das, Mem. Ind. Mus., VI., No. 4, 175 (1918); Hall, Aphid Egypt Tec. and Sc. Ser. Bull. 68, 33 (1926); Willcocks, Sult. Agri. Soc. No. 1, 339 (1922); Theobald, Entomologist, LXI, 49, figs. 2 (1928).

Apterous viviparous female. Green of various deep shades, rather shiny; very small. Vertex of head, most of antennæ, cornicles and cauda dusky green to brown; legs same colour as body; apices of tibiæ and the tarsi darker; rostrum same colour as body, apex dark. Eyes deep red and black. Body and head

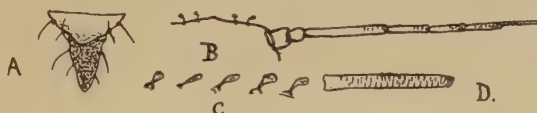


Fig. 203.—*Rhopalosiphum lahorensis* Das.

A. Cauda and anal plate of apterous ♀; B. Head and antenna; C. Body hairs; D. Cornicle. The flagellum in many specimens is longer than shown and the cornicles may be more swollen.

with small spatulate and clavate hairs (Das describes them as capitate). Antennæ thin, half the length of the body; segment i. larger than ii.; iii. about as long as iv. + v., as long as vi.; iv. and v. nearly equal; flagellum from $1\frac{1}{3}$ to $1\frac{3}{4}$ length of base, often



Fig. 204.—*Rhopalosiphum lahorensis* Das.
Apterous viviparous ♀ and young.

equal to iii. ; iv., v. and vi. dark. Rostrum reaches to or past second coxæ, occasionally to third coxæ ; apical segments acuminate. Cornicles rather thin, cylindrical, constricted at apices, in some distinctly swollen towards apex, in others scarcely so, as seen in the figure ; imbricate ; about as long as antennal segments iii. and iv. Cauda from $\frac{1}{2}$ to $\frac{3}{4}$ length of cornicles, spinose, 2 hairs each side. Anal plate dark.

Length 1.2 to 1.6 mm.

Alate viviparous female. Shiny green, with a row of black spots laterally and in some, other dusky markings ; head black ; eyes red ; antennæ black ; segment iii. nearly twice as long as iv. ; iv. a little longer than v. ; base of vi. equal to v. ; flagellum not quite so long as iii. ; segment iii. with 10-17 sensoria ; iv. with 5 to 8 ; v. with 0-4. Thoracic lobes dark ; a dark pronotal band and dark areas on metanotum. Wing veins slightly clouded with dusky tinge ; the membrane a little smoky. Coxæ black ; tibiæ greenish-brown, apices dark and also apices of femora. Rostrum reaches to second coxæ ; dark.

Length 1.2 to 1.4 mm.

FOOD PLANTS. Chrysanthemum.

LOCALITIES. Swanley, xii. 1927 ; India (Das) ; Cairo (Hall).

Observations. This very small species, easily demarked by the hairs, is so like the colour of the foliage that it is difficult to detect. It occurred as isolated specimens under the leaves and at the edges, and was most easily noticed when it occurred amongst the colonies of the pale *Capitophorus*.

It was described by Das from cultivated chrysanthemums in India, and has also been found by Hall in Cairo. Das, speaking of it, says it runs rapidly on the slightest disturbance of the leaf, and Hall also says it is very active. Those I had under observation were sedentary and could easily be picked off the under side of the leaves. In spite of this different habit I cannot separate them from Egyptian specimens I have, nor from Das' description. The femora are certainly a little narrower than in the Cairo specimens, but they vary in width in my series. There is also variation in the relative length of the flagellum.

I can see no reason to place this small species in a separate genus as it approaches so closely to *Rhopalosiphum*, and I have consequently sunk the genus *Stephensonia* under *Rhopalosiphum*.

The shape of the cornicles is varied in the apteræ and they are not so swollen as in the alataæ.

APHIS PYRASTRI Boisduval.

Essai s. Ent. Horti., 253 (1867).

Alate viviparous female. Deep brown; antennæ brown at base and apex; cauda and cornicles dark; in some the cauda is paler; legs deep brown, base of femora and most of tibiæ yellow. Abdomen showing when cleared dark transverse bars and lateral spots. Antennæ not quite so long as the body; segment i.

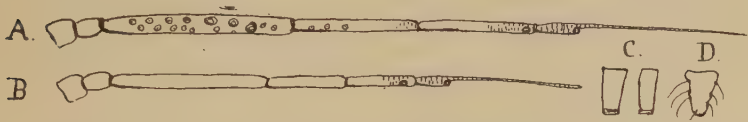


Fig. 205.—*Aphis pyrastris* Boisduval.

A. Antenna of alate viviparous ♀; B. of apterous ♀; C. Cornicles; D. Cauda.

broader but no longer than ii.; iii. very little longer than iv.; iv. and v. equal; base of vi. nearly half v.; flagellum long and fine; iii. with 15-20 small round sensoria; iv. with 2-6 irregularly disposed; v. with 0 + 1. Head flat but with a very slight projection each side. Eyes large, dark. Cornicles short, cylindrical, about as long as base of antennal segment vi. and slightly shorter to same length as the cauda, faintly imbricate. Cauda notched at the sides, slightly longer and wider than the cornicles or about equal, a few hairs each side. Rostrum to or just past the second coxæ. Wings and legs normal.

Length 2 mm.

Apterous viviparous female. Deep brown to chocolate brown, some dull, others shiny. When cleared a large dark dorsal patch shows and bars in front and behind and small lateral spots. Antennæ yellow, dark at the base and apex. Cornicles and cauda and anal plate black. Legs with dark femora, most of tibiæ yellow and yellowish-red, apices and tarsi black. Antennæ long, as long as or longer than the body; i. larger than ii.; iii. a little longer than iv.; iv. and v. equal; vi. with base about $\frac{1}{3}$ of v.; flagellum a little longer than iii. Rostrum rather short, reaches about the second coxæ. Cornicles short, cylindrical,

about as long as base of segment vi. and shorter than the cauda, with faint imbrication. Cauda rather broad and prominent, wider than cornicles, several hairs each side. No trace of lateral papillæ.

Length 1.5 to 2.2 mm.

FOOD PLANT. Pear.

LOCALITIES. Wye, vi. and vii. 14, 15, 21, 22; Brondesbury, N.W., vii. 09; Abingdon, vii. 16; Hoo, Kent, vii. 20; Kingston upon Thames, vii. 89 (F.V.T.).

Observations. A common dark Pear Aphis easily distinguished by the short cornicles and broad cauda, a little longer than the cornicles. It clusters in dense masses on the tops of the young growths and also curls the leaves. It is very much attended by various ants. Much honey dew is made by these insects, of a caustic nature, for I find it often kills the tender growths.

APHIS WATSONI sp. nov.

Alate viviparous female. Antennæ shorter than the body; i. wider than ii.; iii. a little longer than iv.; iv. very slightly longer than v.; vi. with base half of v.; iii. with 11-13 small round sensoria on one side, reaching to apex. Rostrum reaching to second coxæ. Cornicles rather short, not quite so long as antennal segment v., cylindrical, slightly expand-

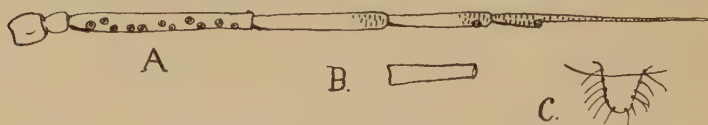


Fig. 206.—*Aphis watsoni* sp. nov.

A. Antenna of alate viviparous ♀; B. Cornicle and C. Cauda.

ing basally, imbricate. Cauda not quite so long as the cornicles, broad, notched at the base, spinose, with several dark, long lateral hairs. A large pair of pronotal papillæ and a pair on abdominal segment vii. Abdomen with three large and one small dark patches each side and irregular median dark areas. Legs moderately long; femora all dark; tibiæ pale except at the apices; tarsi dark; tibiæ with many fine brown hairs. Wings normal.

Length 2 mm.

Apterous viviparous female. Globular. Antennæ shorter than the body; segments i. and ii. dark, apex of v. and all vi. smoky; iii. to vi. imbricate. Head broad, with four short hairs in front. Rostrum rather broad, reaching just to the third coxæ. Eyes large. Cornicles rather long and thick, not quite so long as segment iii. of the antennæ, expanding towards the base, imbricate. Cauda about $\frac{2}{3}$ of cornicles, notched at the sides; spinose, black, with numerous long, curved hairs. A large papilla each side of pronotum and one each side of segment iii. of body. Abdomen with small black spots, of irregular form and rows of short hairs; cuticle with hexagonal sculpturing. Legs moderately long and rather thick, the femora pale at the base and most of the tibiæ, which have outstanding stiff hairs.

Length 2.2-2.5 mm.

FOOD PLANT. Pear.

LOCALITIES. Withington, 7. viii. 26 (Watson).

Observations. Described from potashed specimens. No colour notes kept. This from the shape might be Buckton's *lentiginis*, but as his type does not seem to exist it is not possible to say.

The slide was sent me by Mr. F. Laing and has been returned to the British Museum.

APHIS PALUSTRIS Theobald.

Entomologist LXI. p. 10, fig. 4. 1928.

Apterous viviparous female. Deep green. Antennæ dark, pale green at base of segment iii. Cornicles and cauda deep olive-green to deep brown. Legs same colour as body; femora darkened, except at base, apices of tibiæ dark; tarsi dark. Body ovate. Antennæ less than $\frac{1}{3}$ length of body; segment i.

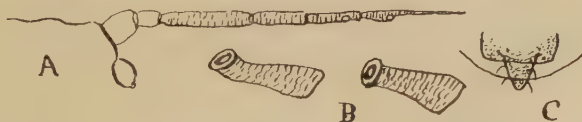


Fig. 207.—*Aphis palustris* Theobald.

Apterous viviparous ♀; A. Head and antenna; B. Cornicles; C. Cauda and anal plate.

larger than ii.; iii. longer than iv.; iv. and v. about equal; base of vi. about $\frac{2}{3}$ of v., flagellum three times as long as base; iii. to vi. imbricate. Rostrum short and thick, reaching

second coxæ. Cornicles short, about as long as segment iii, rather thick, wider at base than apex, which is constricted before the somewhat slanting flared opening; imbricate. Cauda small, bluntly pointed, not so long as the cornicles, almost hidden under the body in some specimens, projecting in others. Legs rather short and thick, a few stiff hairs on the tibiæ. Skin shagreened.

Length 1.5 to 1.8 mm.

FOOD PLANT. *Triglochin palustre*.

LOCALITY. Churchtown, near Southport, viii. 27.

Observations. Described from several mature apteræ found in company with *Aphis triglochinis* Theob. The shortness of the cornicles and cauda might place it is *Anuraphis*, but the cauda is more of *Aphis* type. The antennæ are markedly short and the skin much shagreened. In some specimens, but not all, the apex of the cornicles is very slanting.

Type in the writer's collection.

APHIS ACERIELLA sp. nov.

Apterous viviparous female. A large, globular species; deep blackish-brown to coffee colour, with black lateral spots and some small black spots on the body; antennæ rather thick, dark, except segment iii.; base of iv. slightly pallid; cornicles and cauda black; anal plate and genital plate black; rostrum dark; eyes large, deep red; legs with coxæ and femora dark, especially the mid and hind pairs; tibiæ paler, with dark apices; tarsi dark; a large dark prothoracic tubercle each side and large dark abdominal papillæ. Antennæ about $\frac{1}{2}$ length of body; segment i. larger than ii., both black; iii. a little longer than iv., about as long as flagellum; iv. a little longer than v.; base of vi. about $\frac{1}{6}$ of v.; flagellum not quite three times length of base; iii. to vi. imbricate; hairs short and faint. Rostrum to second coxæ, thick. Eyes large with marked ocular process. Legs rather thick and short. Cornicles about as long as segment iv. of antennæ, cylindrical; markedly imbricate. Cauda very thick, blunt, very spinose, with pale lateral hairs, about $\frac{2}{3}$ of cornicles. Anal and genital plates spinose. Abdomen with large hexagonal sculpturing; two irregular rows of dark glandular spots inside

the lateral spots ; two dark areas in middle of seventh segment and a dark band on the eighth ; the segments with small pale hairs. The dark head has four small hairs in front.

Length 2.5 to 3.0 mm.

FOOD PLANT. Maple (*Acer campestre*).

LOCALITIES. Harpenden, 17. v. 26 (Davidson).'

Observations. A large heavily built species, which shows marked abdominal adornment in cleared specimens. There is a marked pale membrane between the femora and tibiæ and tibiæ and tarsi.

NOTES ON *Aphis rumicis*. In Volume II, p. 98 I gave *Aphis ulicis* Fabricius as a synonym, Fabricius never described any species under that name, but one Black Aphis on *Ulex europæus* is *rumicis*. *Aphis laburni* Kaltenbach also occurs on *Ulex* and oviposits there.

Buckton (Vol. II, Brit. Aphid., pp. 81 and 84) refers to *ulicis* Fab. ?

Franssen (*Aphis fabæ*. Scop. en Aanverwante soorten in Nederland, 1927) separates *Aphis fabæ* Scopoli, *Aphis rumicis* Linnæus, *Aphis euonymi* Fabricius and *Aphis podagrariæ* Schrank and also Roepke (Diss. Wag and Tydschr. Plantensiekten xxxiii. 1927).

The differences seem to me to be too slight to separate *fabæ euonymi* and *podagrariæ* from *rumicis* and I agree with Davidson in placing them as synonyms of *rumicis* Fabricius ; *papaveris* they also consider to be *fabæ*.

Franssen gives another account of all the Black Aphis groups in 1928 (Natuurhistorisch Maandblad 17e Jaargang Nos., 4.5-6 April 27 ; May 31, and June 29.

NEOCAUDUS INFLATUS Theobald.

Entomologist, LXI., p. 9, Fig. 3 (1928).

Apterous viviparous female. Green, glabrous ; body inflated, rounded behind with straight hairs along the border ; legs, antennæ and cornicles dusky ; rostrum green, apex dusky ; eyes

black. Antennæ about half the length of body ; segment i. wider but no longer than ii. ; iii. iv. and v. about equal ; vi. nearly as long as iii + iv. + v ; flagellum three times as long as basal area. Rostrum not quite reaching second coxæ. Cornicles small, cylindrical, straight, not quite so long as segment iii. of antennæ. Cauda small and with anal plate completely hidden under the body. Legs moderately long.

Length 1.8 mm.



Fig. 208.—*Neocaudus inflatus* Theobald.
Apterous viviparous ♀.

FOOD PLANT. *Artemisia vulgaris*.

LOCALITY. Seasalter, Kent, x. 27.

Observations. A very marked species, the inflated body having marked stiff hairs around the posterior half. The antennal segments iii. to v. being equal is also characteristic.

Type in the writer's collection.

ANURAPHIS PYRIELLA sp. nov.

Alate viviparous female. Antennæ a little shorter than the body ; segment i. slightly wider than ii. ; iii. about twice as long as iv. ; iv. about $1\frac{1}{3}$ of v. ; iii. with 60-65 sensoria ; iv. with 19-21 ; v. 0 + 1. Rostrum long and thin, reaching well past third coxæ. Cornicles short and rather thick, constricted at base on inner side ; imbrication markedly dotted. Cauda blunt,

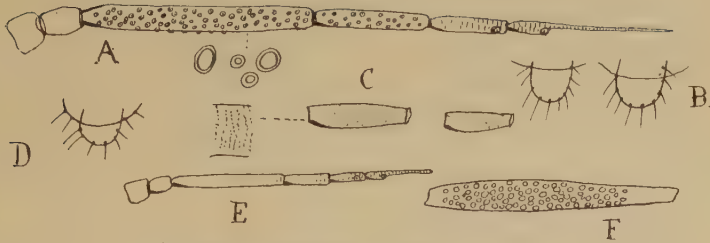


Fig. 209.—*Anuraphis pyriella* sp. nov.

A. Antenna of alate viviparous ♀; B. Cauda; C. Cornicles; D. Cauda of oviparous ♀; E. Antenna; F. Hind tibia.

straight-sided, about $\frac{2}{3}$ length of cornicles, with several fine hairs each side. Anal plate rounded, with many fine hairs. Wings normal. Legs moderately long and thin, base of femora and most of tibiae pale.

Length 1.8 to 2 mm.

Nymph. Dark green to pale green, with dark wing pads. Rostrum to third coxæ. Cauda short and blunt.

Oviparous female. Apterous; green; oval to pear-shaped, showing one or two dark eggs within. Antennæ not half length of body; segment i. wider but no longer than ii.; iii. as long as iv. + v.; iv. a little longer than v.; base of vi. half v. Rostrum rather broad, reaching past second coxæ. Head broad, flat. Cornicles short, thick, broadened basally, about as long and not much wider than segment v. of antennæ. Cauda short and broad, rounded, with several fine hairs. Anal plate broad, rounded, with several hairs. Hind tibiae broadened, with many sensoria nearly to apex.

Length 1-1.5 mm.

FOOD PLANT. Pear.

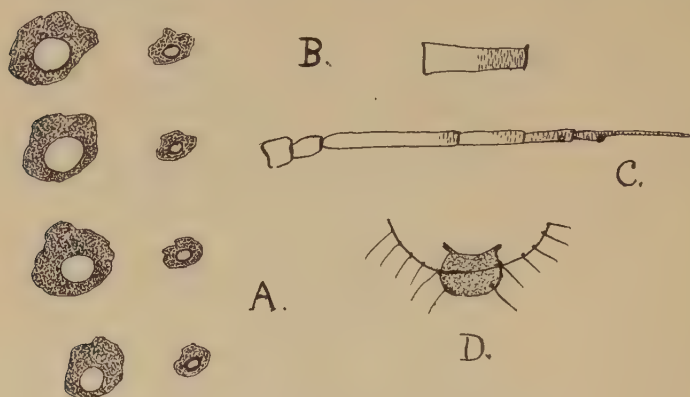
LOCALITY. Wye, 10. ix. 12; 7. ix. 13; 27. v. 23.

Observations. I found this species in my garden in numbers on three occasions. They were clustered under the leaves. Unfortunately no colour notes were kept. It is a distinct *Anuraphis*, the shape of the short cauda being very marked.

ANURAPHIS PETHERBRIDGEI Theobald.

Ent. Mo. Mag., LXIV. 227 (1928).

Apterous viviparous female. Small, black, polished and shiny ; very active ; antennæ black, with segment iii. pale, also base of femora and the tibiæ except their apices. Antennæ more than half the length of the body ; segment i. larger than ii. ; iii. longer

Fig. 210.—*Anuraphis petheridgei* Theobald.

Apterous viviparous ♀ ; A. Spiracles and lateral tubercles ; B. Cornicle
C. Antenna D. Cauda and anal plate.

than iv. ; iv. slightly longer than v. ; base of vi. more than half of v. ; flagellum shorter than iii., not as long as iv. + v. ; iii. to vi. imbricate. Rostrum reaching to third coxæ. The black cornicles are rather thick, cylindrical, slightly narrowing towards the apices, faintly imbricate. Cauda black, small and blunt, with two hairs each side and one dorso-apical. Anal plate black, with a few hairs. Legs moderately long and thin ; tibiæ hairy. Eyes black. Cleared specimens show dark areas around the spiracles and some round, clear lateral spots surrounded by dark areas which may be lateral tubercles ; a dark band caudad of the cornicles and dark anal segment. Body segments with lines of short hairs.

Length 1.2 to 1.5 mm.

FOOD PLANT. Apple.

LOCALITY. Cambridge, vii, 28 (Petherbridge).

Observations. Described from some large colonies found by Mr. Petherbridge on an apple tree in his garden. The insects were under the leaves and produced a certain amount of leaf curling, and were very conspicuous when alive owing to their shiny black colour, small size and active habits.

ANURAPHIS INSTABILIS Buckton.

Aphis instabilis Buckton.

Mono. Brit. Aphid, II., 94 pl. lxxviii., figs. 1-5 (1877).

A slide in the British Museum (N.H.) labelled DB—pyrethrum—in Buckton's writing is evidently this insect, but it is not labelled so by him. It contains four alate females and nymphæ. The short cauda and rather long cornicles place it in my group 2 of the genus *Anuraphis*. It differs from any species with posterior dorsal papillæ in that the antennal segment iv. has no sensoria. Those on iii, vary from 16-24, mainly on one side. (Vide Vol. II., p. 289).

CHAITOPHORUS BETULÆ Buckton.

Buckton, Mono. Brit. Aphid. II., 139, pl. lxxxii., figs. 1 and 2 (1879); Schouteden, Mém. Soc., Ent. Belg., xii., 213 (1906).

Buckton's original description is as follows :

"*Apterous viviparous female.* Dark olive, hirsute and tuberculate. Head broad, with four occipital tubercles. Thorax with two lateral corrugations, tufted with hair. Abdomen flattish, with a marked carination and provided with four longitudinal rows of dark, shiny tubercles. Cornicles just appearing above the surface of the back. Cauda, small, rounded, dark green and pilose. Legs and antennæ pale. First and two last joints of the latter dark. Rostrum reaches to second coxæ.

"*Length* 1.13 × 0.55 mm.

"*Oviparous female.* Apterous, oval, broad across the abdomen, tubercular and tufted with ochreous bristles. Colour ochreous yellow. Head dark brown. A square spot on the thorax and eight or more uninterrupted brown stripes across the abdomen. Legs dark brown, hind tibiæ dilated. Antennæ yellow, with the first and the last joints dark brown.

"*Length* 2.27 × 1.13 mm."

Below I append some more details of the oviparous female and the male.

Oviparous female. Antennæ short, not quite half length of body ; segment i. larger than ii. ; iii. longer than iv. + v. ; iv. a little longer than v. ; vi. about as long as v. ; the flagellum a little shorter than base. Head flat, with four tubercles in front, with rather long hairs. Cornicles very short and truncate, pallid. Legs with scanty pale hairs ; hind tibiæ slightly dilated with indistinct sensoria on basal half. Several ova in each female. Rostrum reaches second coxæ. Cauda and anal plate protruding, with rather long, dense hairs.

Male. Apterous. Yellowish brown, darker in middle and on head ; antennæ and leg brownish ; eyes black, large. Antennæ about $\frac{2}{3}$ length of body ; segment i. larger than ii. ; iii. longer than iv. + v., with 15-17 very small, pale, round, sensoria spread over it ; iv. a little longer than v., with 5-7 small sensoria ; v. with 3-5 + 1 ; vi. a little longer than v. ; base and flagellum about equal. Legs rather thick, mid pair much nearer hind than fore. Rostrum short, not reaching second coxæ. Cornicles very small, pale, truncate. Body hairs scanty. Claspers short and thick black ; penis pale, truncate.

Length 1.2 mm.

FOOD PLANTS. Birch (*Betula alba*).

LOCALITIES. Walthamstow ix. and x. (Buckton) ; Boxmoor, 23 x. 1913 (F.V.T.) ; Belgium (Schouteden).

Observations. Buckton's type in the British Museum is in a fragmentary condition. His apterous viviparous female was taken by Mr. Wallace in September and the oviparous female taken with a male in October. The male was not described by Buckton. My specimens of male and oviparous females were taken on Silver Birch on the leaves.

FORDA FORMICARIA Heyden.

Dr. Mordwilko has recently shown (Acad. d. Sciences, 3 Dec., 1928, p. 1070) that Passerini's *Pemphigus semilunarius* (Giornale Giardini, III., 261, 1856) found on *Pistacia terebinthus*, is the aerial form of the common *Forda formicaria*.

LACHNUS(?) FORMICOPHILUS Buckton.

Buckton, Science Gossip, No. 81, vii. 257 (1901) ; Donisthorpe, Ent. Rec. 39 (1902).

Buckton's description is as follows: " Male. Body small, globular, black, covered with white flocculent matter. Pronotum with two shining black bubbles on the back. Head rather large. Antennæ very long and six-jointed. Legs brown, slender, long. Fore wings ample, with fine black nervures and with a hyaline stigma, bordered only with brown. Expanse of wings, 11.0 mm. Oviparous ♀ unknown. In ant's nest."

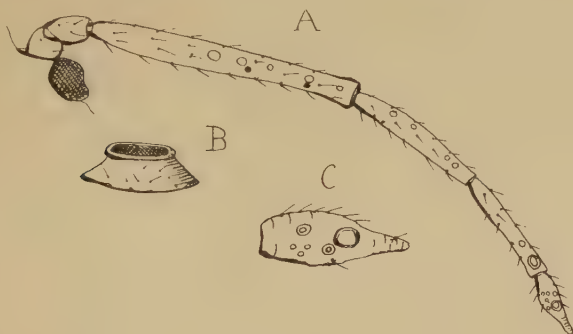


Fig. 211.—*Lachnus formicophilus* Buckton.

A. Antenna of apterous ♀ ; C. Apex of same ; B. Cornicle.

The type does not seem to exist and the description and figures are too vague to be of much value. Two apterous, viviparous females taken by Donisthorpe in nest of *Formica rufa* at Oxshott in 1900 and at Weybridge (6. ix. 12) may be this insect, a description of which I append: Head and thorax chestnut brown ; abdomen pale greenish ; two pairs of black spots on the segments ; cauda dusky, a black area beneath. Legs with apical half of femora, base and apex of tibiæ and the tarsi dark brown, remainder reddish-brown. Antennæ dark brown. Antennal segment iii. nearly as long as iv. + v. + vi., with 5 sensoria ; iv. about equal to v. ; with 4 sensoria ; v. with one very small secondary and one large primary ; vi. short and stumpy ; all hairy. Rostrum nearly as long as body. Pro- and mesothorax deeply constricted off, the former narrower than head. Thorax

and abdomen with dense, short, dark hairs. Apex of body dark and hairy. Cornicles dusky.

Length 4 mm.

NOTE ON THE GENUS *Cinara* OF CURTIS.

In 1835 Curtis described a genus *Cinara* (British Entomology, Sec. 576). He gives *Aphis pini* Linnæus ? as type, but he figures and describes *Cinara roboris*—the *Aphis roboris* of Linnæus.

It is considered by Baker that *Cinara* (he spells it *Cinaria*) cannot take precedence of *Pterochlorus* as Curtis gives *Aphis pini*. Linnæus ? as type. Laing holds a different view in which I agree.

Laing says: "The point is simply this, Curtis defines the genus *Cinara* and describes and figures *roboris*. Unfortunately he says typical species *Aphis pini* Linnæus ? It was obvious, therefore, he knew nothing about *pini* and that what he had in mind for his genotype was what he was figuring and describing, namely *roboris*. It is my contention that you cannot base genera on species you do not know and that in nomenclature you must interpret what a man obviously meant."

In the same year Burmeister erected the genus *Lachnus* and placed his *punctatus* in it (which is *saligna* Gmelin—*viminalis* Boyer).

Both being erected in the same year I am not sure which has precedence—*Cinara* or *Lachnus* over *Pterochlorus*.

NEOCHMOSIS ABIETIS Walker.

Aphis abietis Walker.

Anns. Mag. Nat. Hist. II. Se. 2, 100 (1848).

A slide of Walker's labelled *Aphis abietis* is in the Hope Museum, Oxford and is evidently this insect. It contains an alate female, apterous females and one oviparous female. Walker describes the alate female, apterous female and male, but not the oviparous female. The *viviparous apterous female* he says, is oval, pale red and hairy, antennæ pale brown and nearly as long as $\frac{1}{4}$ of the body, the fourth joint less than half the third, fifth much longer than fourth, the seventh extremely short; rostrum reaches far beyond the hind-hips; nectaries dark; legs dull reddish-brown, hairy.



Fig. 212.—Wing of *Neochmosis abietis* Walker (F. Laing).

The *alate female* same colour as former, but head and disc of chest brown ; feelers less than half body. The pupa pale whitish-red, limbs very pale red ; feelers and mouth with brown tips ; the former hardly $\frac{1}{3}$ of body ; the nectaries dark red ; feet and tips of shanks brown.

The *winged male* dark brown ; feelers brown, yellow at base, more than $\frac{1}{2}$ body length ; mouth yellow with brown tip, nearly as long as body ; legs yellow and stout ; knees, feet and tips of shanks black ; wings very much longer than body.

I add the following notes made on the specimen in the Hope Museum, kindly lent me by Professor Poulton.

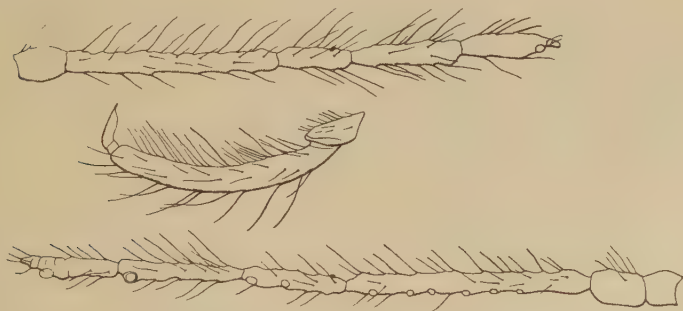


Fig. 213.—*Neochmosis abietis* Walker.

Antenna of apterous viviparous ♀ ; Hind tarsus and antenna of alate viviparous ♀ (by Laing).

Alate female. Antennæ very thin, less than half the body, hairy, hairs long ; segment i. shorter than ii. ; iii. very slightly

longer than iv. + v.; iv. shorter than v.; vi. as long as iv.; iii. with 6 sensoria; iv. with 2; normal primaries on v. and vi. Head with rather long hairs. Rostrum long, thin, acuminate. Prothorax and abdomen hairy. Cornicles cone-shaped with many hairs. Legs very hairy. Wings normal.

Apterous viviparous female. Antennæ thin, about $\frac{1}{4}$ length of body; very hairy; i. longer than ii.; iii. longer than iv. + v.; iv. shorter than v.; vi. a little longer than iv. Rostrum thin, acuminate, reaching well past third coxæ. Body hairy. Legs moderately long and thick, very hairy, many hairs longer than width of segments.

Oviparous female. Apterous. Antennæ very thin and short, not so long as head and thorax; segments i. and ii. about equal; iii. about as long as iv. + v.; iv. not so long as v.; vi. as long as iv.; very hairy, hairs long. Rostrum thin, acuminate, reaching past 3rd coxæ. Body hairy, hairs long posteriorly. Body contains one ovum. Legs moderately long and thick, very hairy; posterior tibiæ with many small sensoria all over. Cornicles with many hairs. Eyes large.

The label in Walker's writing says "Spruce, Southgate, July 24th, 1847.

NOTE re *Pemphigus fuscifrons* (Koch) of Buckton.

In Vol. III., p. 113 of his Monograph of British Aphides, Buckton describes and figures (Pl. cx. figs. 5-9) Koch's *Pemphigus fuscifrons*. Mr. Laing has examined Buckton's material in the British Museum and finds it is *Pemphigus lactucarius* Passerini, the ground form of *Pemphigus bursarius* Hartig.

OBSERVATIONS ON THE LIFE-CYCLE OF *PERIPHYLLUS*
TESTUDINATUS Thornton and *P. ACERIS* Koch.

by A. W. RYMER ROBERTS, M.A.

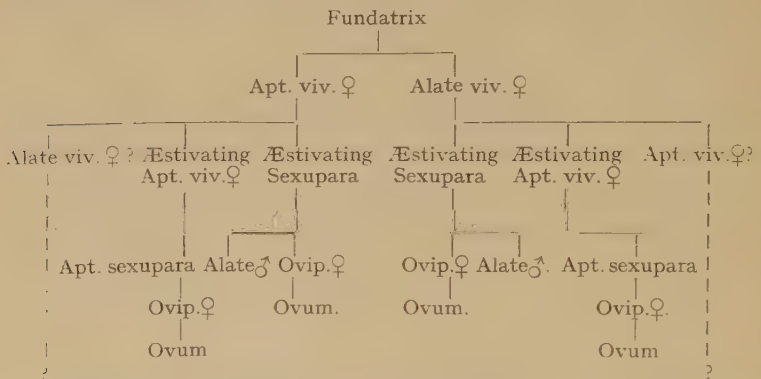
Molteno Institute for Parasitology, Cambridge, Dec. 1928.

The fact that these two species spend their lives on the same tree is no doubt responsible for the confusion between them in the minds of Balbiani and Signoret (1867) and most of the earlier writers on this subject. The true position was not realised until Kessler published his account of the development and life history of these and of *P. lyropictus* in 1886 (Nova Acta Ksl. Leop.-Carol. Deuts. Akad. Naturforscher, Halle, LI, 151-179). Up to the present I have not had the opportunity to verify his statements as to the earlier stages of the life-cycle of the two species, but during the last three years my observations on the generations beginning with the æstivating form (or summer larva, as he calls it) in each species confirm the account which he has given. The life-cycle in these, as in many other species of Aphides, is occasionally complicated by the intrusion of parallel forms; but the important point in each is that, speaking generally, the æstivating forms are the first larval stages of the sexuparæ, which in the autumn rapidly pass through the growing period and become the mothers of the sexual forms. The æstivating larvæ, at least in *P. testudinatus*, are themselves in individual cases so late in passing through their remaining instars that some of them still remain in the æstivating stage when the frost comes and brings down the leaves of the host plant. This fact, added to the further one that the mature sexual females, progeny of the æstivating forms, bear in general appearance a considerable resemblance to the apterous viviparous females is probably sufficient to explain the assumption of Balbiani and Signoret that the æstivating forms are a sterile generation and that the race is entirely carried on by parallel forms which produce the sexual males and females.

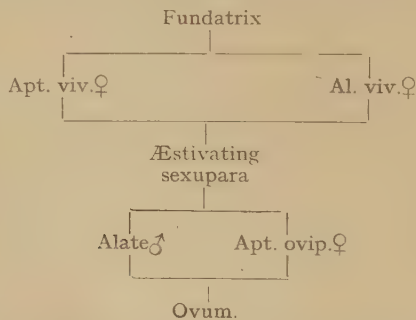
My breeding experiments have shown, moreover, that, in addition to the apterous (possibly also alate) viviparous females of *C. testudinatus* which may be found throughout the summer,

parallel to the æstivating forms, the mature æstivating forms produce not only sexual males and females but also apterous viviparous females. This statement refers to the autumn-forms of both species.

Piecing together therefore the early stages in the life-history of these two species, as given by Kessler, with the later stages as observed by myself, we see at present a life-cycle as shown below :



Simplified and omitting the parallel generations, the life cycle, as observed by Kessler, may be represented thus :



The following notes concerning the generations bred may be added :—

Periphyllus testudinatus Thornton.

Apterous viviparous female. The tubercles from which the dorsal setae arise appear to be brown constantly, though the amount of pigmentation varies considerably as between individuals.

In the spring of 1927 a colony of this species was found, which after being in the laboratory for about a week produced, in addition to normal alate viviparous females, a number of intermediates between the apterous and alate viviparous females. These were producing the æstivating form on May 15th, their wings being in some cases the merest rudiments and in others being almost fully developed. The number of the sensoria on the third segment of the antennæ corresponded approximately with the development of the wings, those with the greatest number having the fullest development of wings. The pigmentation of the thorax was darkened in places but showed also patches of green; and the dark spots on the tergites of the abdomen resembled those of the normal pupa, not being united into transverse bars as in the alate female.

Apterous æstivating female. These larvæ are produced by both apterous and alate viviparous females. The first moult takes place towards the end of September, the foliate processes being then lost and their places taken by setæ.

In the second instar the general colour of the larva is bright green, the posterior part of the head and pronotum, except the sides, brown. The lateral parts of the tergites from the metathorax to the cornicles (5th abdominal segment) suffused with brown. Cornicles green, short, sub-conical and resembling tubercles, with rather broad rim at the apex of each. Posterior segments green. Antennæ and legs colourless, except for a few flecks of green pigment. Antennæ each consisting of five segments, in place of the four found in the first instar. Setæ rather long, somewhat tapering and slightly thickened at the apex. These are arranged on the body in four longitudinal rows, the two sub-median rows consisting of a single seta and the two lateral rows of two setæ each, on each segment from the metathoracic to the 7th abdominal. The legs are stout and bear a considerable number of short fine setæ, chiefly on the tibiæ. Eyes reddish with about twenty rounded facets in each. Rostrum broad and reaching to the intermediate coxæ.

In the final instar the æstivating female (usually sexupara) bears some superficial resemblance to the oviparous female; the latter may, however, be distinguished (inter alia) by the presence of the numerous sensoria on the posterior tibiæ. The brown cruciform mark on the dorsal surface, described by Kessler,

may occur in either of these generations and both have the setæ on the abdominal tergites arranged in six rows longitudinally.

Sexuales. Kessler (p. 163) describes the young larva and gives the colour of the body as bright green. Mine were at first yellowish. As they grow, the males develop a spot of darker colour on the abdomen which is lacking in the females, though the latter may possess some darker colour on the thorax. I have only met with winged males. These have a large number of sensoria on the third, fourth and fifth segments of the antennæ and black transverse bars on the abdominal segments. The ova are dark olive green.

Periphyllus aceris Koch.

Apterous æstivating female. The young larvæ, which are found crowded together in groups of up to forty individuals on the lower surface of the leaves, differ widely from the corresponding form of *P. testudinatus*. They possess short wartlike cornicles, which are entirely absent in this stage of *P. testudinatus*, and the very long wavy setæ in place of phylliform appendages serve as a further distinction (amongst others) between these two species, though the young larvæ of *P. lyropictus* Kessler have setæ of very similar length.

The mature insect is pyriform, yellow, with russet-brown thorax and a large patch of the same colour extending posteriorly almost to the extremity. This pigmentation is also extended nearly to the sides in the case of several of the anterior abdominal segments, giving thus almost the cruciform mark described by Kessler for the corresponding stage of *P. testudinatus*. I have not found at this stage the V-shaped mark described by Kessler for this species.

Sexuales. The young sexuales may be distinguished from the apterous viviparous females at an early age, both male and female being more elongated and parallel-sided. They are yellow in colour, with flecks of dark green colour within the body. When approaching maturity the male has developed a patch of the same colour in the abdomen, and in the final (winged) instar is marked with a series of dark, nearly black, transverse bars on the

abdominal tergites. He much resembles the male of *P. testudinatus*. The typical oviparous female, however, differs both in colour and form from that of *P. testudinatus*, being yellow or greenish yellow (in place of dark olive green) and rather noticeably elongate (instead of pyriform).

The ova when first laid are yellow, but after exposure for a few days become dark olive green.

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